THE SELECTION OF
CHILDREN FOR SECONDARY
EDUCATION

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FOREWORD

THIS little book is mainly an account of experience gained during the eight years for which we have acted as chief examiners for the minor-scholarships examination of the West Riding County Council.

From thirteen to seventeen thousand picked children sit annually for this examination. During our first three years, two thousand border-line cases were further tested by an oral examination, which in the next three years was replaced by a standardized intelligence test conducted by Professor Godfrey H. Thomson of the University of Edinburgh In 1935 and 1936 this intelligence test was applied to all the candidates, and, in determining the results, equal weight was given to English, arithmetic, and intelligence test.

We have had wide experience, both as teachers and as chief and assistant examiners, of various other examinations such as School Certificate, Matriculation, and Training College. In this volume, however, we are concerned chiefly with the child of ten or eleven who is ready to pass on to some form of post-primary education. The task of discovering what type is most suitable for each individual child should be, we believe, as much the concern of the community as of the experts, whether these be examiners or the examiners of examiners

We wish to thank the West Riding Education Committee for permission to use material collected by us while in their service, and to state that they are in no way responsible for any of the opinions here expressed.

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CONTENTS

I

INTRODUCTORY

MUCH has been written, much said, in recent times about the inefficiency of examinations. They have been attacked from many standpoints, and much statistical and general information has been marshalled in the attack. To the lay mind, the case against them seems formidable. The most vulnerable point of attack would seem to be the public examinations for ten- to twelve-year-olds, mere children as these examinees are. It is to this well-defined section of the examination field that the present review will be limited—in the belief that parents, teachers, and those responsible for the local administration of education will welcome a clear statement of the present-day situation and some discussion of its problems. Although we are here concerned primarily with the selection of pupils for "Secondary Education," many of the difficulties and dangers attached to such selection are found again in School Certificate examinations, University Scholarship examinations, and indeed in the whole examination system.

Our national character, whatever be its failings, has a way of demanding the application of common sense to the solution of its problems. Children, in all their variety of inheritance, are now born into a community with a very complex culture and organization, and in the space of a little more or less than twenty years, they have to become self-governing members of that

community. Common sense expects that each individual will be trained in such a way as to give his maximum amount of service to the community, and at the same time to develop his own personality into the fullest life of which it is capable. In this country, fortunately for us all, the two aims are not antagonistic.

All mothers know how much of education comes before school age: we recall, in particular, the first lessons in the care and control of our bodies. This task is heaviest of all for mothers with children of but stunted intelligence. Nearly all children, however, have intelligence enough to learn to read, write, and count, and to acquire skill with these common tools of knowledge Neglecting all sub-normal children, we know that by the time the average child is eleven years of age, approaching adolescence, he has learnt to read silently or aloud with more or less fluency, learnt to express his desires and meaning in words spelt more or less correctly, learnt also the methods of counting and measuring in most common use in this country. These things he has learnt at an age when his memory for learning by heart is at its quickest and most retentive. Other important lessons—singing and dancing, games and physical exercises, various forms of handwork—must accompany these to ensure the development of control of the body. Learning through doing is at least as important as learning through books. The subject-matter of a child's reading and handwork will also have opened his eyes to the world about him, a world of many nations with a long and interesting past. Generally speaking, however, health and control of the body, together with the acquisition of the necessary learning tools of reading, writing, and counting, are

8

the aims of the education of the average child up to the age of eleven years.

The crux of the problem of examinations for children arises just at this point. How are we to decide for each individual what type of education is to follow this agreed type of early education? In England at present the educational situation is complicated, and, as a consequence, educational nomenclature is ambiguous Even in such a book as this, therefore, we must strictly define our terms; the word "Secondary" in particular may convey different ideas to different people. We begin with its correlate "Primary." Primary education, strictly speaking, means education from the cradle to an average age of eleven years. It is given at first in homes, Nursery schools or classes, Kindergartens, Infant schools and departments. Primary education is continued in Junior schools or departments, and in the preparatory departments of so-called Secondary schools. Occasionally we find "Primary school" used as equivalent to the older term "Elementary school," but in the following chapters, the term Primary will be strictly confined to all education up to the age of about eleven years, and to all schools and departments and classes enumerated above which provide such education.

Those acquainted with the Graded Sunday-school movement will remember that Primary is there used to denote the stage between "Beginners" and "Juniors." It in no way corresponds with Primary as used in day schools, the transition age between Primary and Junior in Sunday schools being about three years lower than that between Primary and post-primary in day schools. This may be one of the causes which has led to confusion in the use of this term.

9

SELECTION OF CHILDREN

By a "Secondary school" in the following chapters we mean a post-primary school predominantly academic in its curriculum, which retains its pupils at least to the age of sixteen and may retain them to the age of eighteen. It provides the most difficult form of education for young people in the post-primary stages, and is thus best suited to children of an intelligence distinctly above the average The selection from Primary-school children of those who should be educated in these Secondary schools is the main subject here under discussion. We ourselves have had long and intensive experience of the methods by which such a selection is made in the case of one of the largest Junior Scholarship examinations in the country, that of the West Riding of Yorkshire County Education Authority. In the earlier part of this book we therefore confine ourselves to a discussion of the selection of children for post-primary education of this Secondary-school type. Later we shall touch briefly on the general questions of the various types of post-primary education and of the various methods by which selection for the different types may some day be made

II

EQUAL CHANCES FOR ALL

PERHAPS only those who have struggled for years with the problem of giving every promising child in a district an equally good chance of obtaining Secondary education are aware of the extreme difficulty of their undertaking. Most examiners' perplexities arise out of their anxiety to dispense simple justice: after all their efforts they remain aware that what is given is sometimes very rough justice indeed. In this country, however, degrees of injustice exist: we have wide variations in examination policy and in examination technique. Clear thinking about these problems is essential for further progress in their solution.

Some difficulties arise because of the varying quality of Primary education itself. In the local Press of certain districts advertisements may be read offering tutorial help certain to ensure success in a Secondary-school scholarship examination. Schools placed in areas similar in their amenities differ widely in their achievement of scholarship successes. If children succeed only because they have been specially coached or "crammed" for the tests, their future career can be a poignant disillusion. If children fail because they have been badly taught, or because they have been educated in small schools where one teacher must attend to the needs of children of widely differing ages, valuable leaders may be lost to the community. Examiners must somehow equalize the

chances of the overtaught, the undertaught, and the badly taught.

Behind the diverse schools stand the diverse homes. Some homes are made by parents eager for their child's educational progress, possessing some books and taking every opportunity of borrowing others, reading a well-informed newspaper, talking of the affairs of their district, their country, and the wide world. Others are made by parents careless of their child's intellectual needs, using, perhaps of necessity, all of his leisure for assistance in the support of the home, patronizing only the yellow press, conversing only of scandal, gambling, and the immediate happenings of their narrow environment. The examiners must endeavour to do justice to promising children suffering from such handicaps.

In their physical assets the children to be tested vary greatly. Some clever children sleep well; some sleep rather badly: this may be so, independently of the good or bad opportunities for rest offered by the homes. Some are given the diet their active brains require; the diet of others is sadly deficient in this respect, although most mothers make valiant efforts over the breakfast on an examination morning. Some children are too nervous to do the breakfast justice; others, not necessarily the same ones, too nervous to do themselves justice in the tests. Reserved children as well as nervous ones are seriously handicapped, especially in an oral test of any kind. And any mother can bethink herself of the devastating effects of a day's toothache or a night's earache, a small accident, or the unlucky effects of an ill-timed dose of medicine, in cases where children have only one opportunity of taking an examination. On the physical side the possibilities of

12

real inequality have to be faced by those responsible for examination tests.

Fifty years ago it was difficult for girls to obtain any sound post-primary education. The poorer girls at once began to work, while the wealthier girls went to "finishing schools," where they learned, perhaps, dancing and deportment, to paint, to play the piano, to chatter inaccurate French. At the present time scholarships for secondary education provided out of public funds are given on the same basis to both boys and girls. Boys and girls alike may climb the whole height of the educational ladder. It is true that there are more very able boys than very able girls, just as it is true that there are more very stupid boys than very stupid girls, the distribution of qualities in the male creation being throughout nature in general wider than the distribution of qualities in the female creation. There is no more one ideal form for a girl's education than one ideal form for a boy's education. both depend on individual needs and abilities. Curricula for girls may well be on slightly different lines from those for boys, but their main intellectual needs are the same Examiners have to ensure that both boys and girls have fair play in their chance of further education, but, so far, only a small amount of research has been done in order to discover what kind of test papers are equally suitable for both boys and girls. To this we shall return on pp. 101–109.

Not only have we to examine both boys and girls: we have to test an able boy, Tom, whose mental make-up may be far more different from that of an equally able boy, Dick, than from that of an equally able girl, Mary. Some of us learn best through our ears, some through

our eyes, some through speech and action. Some able children develop muscular co-ordination at a much earlier date than do others; some very promising children have great difficulty with writing until they are approaching their teens. How are we in one set of tests to do justice to all these different types?

A far more serious difficulty for those trying to ensure fair play for all children is one which at first occasions surprise in many minds. The month of the year in which a child is born seriously affects his chances of securing a scholarship. Exactly which months are most unlucky depends on the exact age limits fixed for any examination by the local authority. If the children have to be between 10 and 11 or 11 and 12 on April 1st, and if separate papers are given to 10-year-olds and 11-year-olds, the unlucky birthday months are January, February, and March, and the luckiest ones usually April, May, and June. If the children have to be between 11 and 12 on August 1st, and only one paper is set, the unlucky months are May, June, and July, while the luckiest ones are August, September, and October. For, naturally, the younger a child is, the less likely is he to do well in a paper set for a range of a whole year · the older a child is, the more likely is he to be successful. An increasing number of authorities—one hopes that soon it will be all—give a bonus of marks to the younger children to equalize their chances with those of the older ones. But the correct amount of the bonus in any given test is a matter on which experts differ, and some research now being carried out has reached results at variance with first expectations. This matter is dealt with in Chapter VII.

A further complication arises because children who have been for some time in a class (say, over half a year) tend to do better in a test than those more recently promoted. As promotions are made, in general, once or, at most, twice a year, on fixed dates, and as they are settled to a great extent by *year*-age, not *month*-age, certain children have a birthday advantage of another kind. In fact, one of the most troublesome problems for examiners is the birthday problem. It has even been suggested that, if 100 scholarships are to be awarded, 8 should be given to children born in January, 8 to February children, and so on; in effect, that competition should be restricted to children born in the same month. In big areas, where scholarships number thousands, this plan would not work too unfairly, but in small areas where there are, say, 100 scholarships, there are accidental happenings which would vitiate this apparently simple solution. It might chance in one year that the January set were particularly able, and the June set particularly dull, and so the chances of the June and January children would again be unequal. Where there are large numbers, there is not likely to be anything like the same unevenness in ability from month to month. It is like insurance statistics. No one can say out of a group of 200 twenty-year-olds how many will die between 20 and 30; but one may come pretty near the truth in considering a group of 2000, and very close indeed to it with a group of 200,000.

Finally, we may gather together a number of minor factors militating against even dispensation of justice. Most authorities make the greatest possible effort to give every candidate a quiet place in which to take the

examination, with sufficient fresh air and warmth; sympathetic, lucid, careful, and tranquil supervisors; good pens and ink and paper, with clearly-printed question papers: yet irregularities occur, some of them accidental, some of them in the nature of the event. Some children have farther to travel than others, to some the examination centre may be more unfamiliar than to others, against inclement weather some are better protected than others. In the case of an oral examination, the inequality in the conditions may be very serious indeed. Examiners who don academic dress to examine ten-year-olds from an elementary school in a poor district, or trimly dressed maids who answer the main door of a centre and direct the candidate to another much less obvious entry, are alike formidable to shy individuals. The personal equation is bound to enter in, and where the personnel of the examining board varies from district to district, and no strenuous efforts are made to standardize the interview, very unequal conditions may result for the candidates. This is true, even if other influences never enter in at all. Under small authorities, where the candidates' parents and homes are known to examiners, the personal factor enters for a second time into an interview, and the suspicions about undue influence which exist in certain places may not always be entirely groundless, human nature being what it is.

Is it to be wondered at, then, that the success or failure of individual children in scholarship examinations sometimes causes surprise? All true educationists aim at giving equal chances to all children: but it must be admitted that the aim at present far outreaches the grasp.

III

TYPES OF TESTS IN CURRENT USE

IN the light of what has been written in Chapters I and II, it will be obvious that an important duty of every educational authority is to find as reliable a method as possible of selecting those Primary-school children of about eleven years of age who are to proceed to education in the Secondary schools. Before considering the various possible methods and tests, we must try to decide what it is we wish to discover about these children. How far are their natural ability and intelligence, and how far are their attainments to influence us in classifying them?

There has been in the fairly recent past a healthy reaction against the mischievous type of examination which was confined to testing acquired knowledge, and which therefore lent itself to wholesale cramming and was of little value in finding the naturally able children The pendulum has perhaps swung a little too far the other way: some even affirm that at this age what the child knows and can do does not matter, only what he is. The two, however, are in some ways inseparable, and even if it were possible to devise a means of discovering the child's innate capacity independently of anything else about him, we should still not have obtained all the evidence relevant to our purpose of selection. It must surely be admitted that what a child has learnt of the world in which he lives, what he has learnt to do with his hands, everything in fact that he

has learnt at his Primary school, depends to a great extent, though by no means entirely, on his native ability: such information, therefore, cannot be altogether ignored in the process of selection. Since, however, these things depend more on the teaching a child has received and on his home environment than on his native ability, they must be used with caution.

Another point which is often ignored by supporters of one or another of the current ideas as to the best type of test is the reaction of these prescribed tests on the work of the Primary schools. If, for example, continuous English composition is never asked for in the examination, as is desired by the advocates of the "short-answer" type of test, it is greatly to be feared that the ability of children in the Primary schools to write simple continuous English will grow less. Similarly if questions on decimals are never included in the arithmetic examination, it is unlikely that the majority of the children concerned will at this stage be taught decimals.

It seems likely then that concentration on one type of test is undesirable, if not dangerous. What combination of methods is likely to prove best suited to the purpose in hand? The main methods of selection at present in use, or recommended for use, are (1) written examinations, (2) oral examinations, including interviews conducted by trained psychologists or others, (3) intelligence tests, (4) internal school tests of every kind, (5) Primary-school records, including the estimates of the Heads of the schools.

In any area where the competitive element is strong, it is the usual custom to hold a preliminary test in the Primary schools, by means of which the Heads decide which children shall proceed to the final examination.

18

Under some authorities the Heads are allowed to conduct this test in any way they choose; under others it is a test set by the inspectors of the local education authority, but marked by the teachers. in some cases this marking is accepted as final, in others it is subject to scrutiny and revision in the education office. This procedure, however, needs careful safeguards in the way of allowing unrecommended children to take the further examination if their parents so desire.

The basis of all Secondary-school entrance examinations is at present a written examination of one type or another in English and arithmetic. It used to be considered necessary to test also geography and history and sometimes in addition a variable and elusive thing called general knowledge: but it is now generally recognized that tests on these latter subjects, demanding, as they most often did, factual knowledge which could be crammed, were not only useless, but actually inimical to a true selection, and all but the most unenlightened authorities have abandoned them. The nature of the tests in English and arithmetic will be discussed in the next two chapters, but it may be noted here that just as the written examination in arithmetic and English should not be the only test used, since some children's native ability is not revealed by such examinations, so written tests should never be omitted altogether, for there is also a type of child who, embarrassed by personal contacts, best shows his quality in impersonal examinations

It is comparatively simple for any authority, however large, to conduct a written examination, including the standardization of its marking and the making of due allowances for differences in the ages of the can-

didates, with all the justice that is humanly possible. When we come to oral examinations and interviews, the difficulties are much greater. Let it be said at once that, where the difficulties of standardization are not insuperable, an oral examination conducted throughout by the same person or persons is of the greatest value as the complement of a written examination. Where, however, an authority is faced with the task of sorting out some fifteen thousand selected children, the impossibility of standardizing the marking of an oral examination renders invalid any conclusions drawn from it. Even in such cases, however, the interview may be of immense value. While the "oral examination" allots marks for answers to questions, reading aloud, alert manner, deportment, and so forth, attempting to make a numerical estimate of the candidate's suitability, the "interview," usually based on a selection of carefully standardized questions, seeks to make a qualitative rather than a quantitative judgment of the direction and strength of the child's interests and capacity. Trained psychologists are the ideal interviewers, but teachers, inspectors, and external examiners in some areas make excellent use of the interview as contributing valuable additional evidence in border-line cases.[1]

Standardized intelligence tests, after having for many years served as a subject for the humorist, are now being placed by some enthusiasts on a pedestal to which they have a doubtful right. In our time, when the greatest and most experienced examination experts grow more and more harassed by the apparent futility of their attempts at standardizing the marking of some

[1] Brockington· *A Secondary School Entrance Test* (Oxford University Press) pp. 15–23, and below pp 112, 120.

dozen or more assistants, or even of their own marking over any considerable period of time, intelligence tests have been welcomed as the solution of all their difficulties. They are indeed a solution of the great difficulty of standardizing marking: they do, moreover, test certain qualities, such as alertness and powers of quick and accurate reasoning, which no other tests would appear to do with equal success; they give a chance to the able child to whom writing is still a difficulty; yet it is doubtful whether by themselves they are adequate as a means of selecting children for Secondary education. Moreover, that there are dangers attached to intelligence tests in inexpert hands is fully recognized by the experts. The most that these will claim is that intelligence tests, while far from perfect, are almost certainly more reliable than any other form of test yet devised.

Those who have done research work on the value of an intelligence test as part of a Junior Scholarship examination[1] agree in their conclusions, which may be briefly summarized as follows:

(1) The prognostic value of the intelligence test is higher than that of the ordinary written test in either arithmetic or English, but is sometimes very little higher.

(2) The highest prognostic value is obtained from a carefully devised and mathematically controlled com-

[1] See, for example, A D Amos, "Examination and Intelligence Test Forecasts of School Achievement" · *Brit. Journ. of Educ Psych* , 1931, Vol. I, p. 73: J. W. Collier, "Predictive Value of Intelligence Tests for Secondary Education". *B J.E P.*, 1933, Vol III, p 65· A. G Hughes, "Discrepancies between Results of Intelligence Tests and Entrance Examinations to Secondary Schools· *B J.E P.*, 1934, Vol. IV, p. 221 · C. W. Valentine, *Relativity of Examinations* (Univ. of London Press, 1932), pp. 97–100.

bination of intelligence test and written examinations in arithmetic and English.

Though intelligence tests are devised primarily to test native ability, it must be noted that they do also test attainments. In the first place those used in Junior Scholarship examinations depend on an ability to read and write. Moreover, in working the calculations generally included in intelligence tests a knowledge of certain arithmetical processes is necessary, while success in answering many of the questions is in direct proportion to the number of words which a child has absorbed into his vocabulary; even experiences in his life, *e.g.*, a visit to a farm, or familiarity with a railway station, may have some influence on his success.

It is now probably generally agreed among expert examiners, however, that no selective examination is complete without some use of an intelligence test, and there will be room for much wider use of such tests as new types of questions are invented, tested, and proved to be sound. Mental arithmetic and short-answer tests in English are closely allied to intelligence tests. A consideration of their value and of whether they can be relied on to the exclusion of more complicated and longer sums in arithmetic or of essays in English is deferred to Chapters IV and V.

Internal Primary-school tests other than standardized intelligence tests can never be of any service where there is a question of competition or of a general qualifying standard involving many schools spread over a wide area, such as the West Riding of Yorkshire. All those who have had anything to do with such methods in the course of examining for entrance to Secondary schools know well that the standards from school to

school vary so enormously as to make the use of internal tests to sort out the children of a wide area entirely lacking in justice. Other methods of securing the co-operation of the teachers which are being tried by various educational authorities have much greater promise of success than any form of internal test.

School records of individual children are rarely of much more value. Those who have had to make use of them at oral examinations know how unreliable the estimates of some teachers may be. In the desire to further what they think are the real interests of the children —the motive is always an excellent one—these teachers are apt to distort and exaggerate facts "Omnivorous readers" have been discovered to have read two or three books at most; children "keenly interested in their surroundings" know nothing of a general election in progress at the time; "nature lovers" can name but few trees and flowers; even serious defects of sight or hearing have gone unnoticed or at any rate unrecorded. The existence of the comparatively small minority who thus betray their lack of knowledge or observation of the children under their charge renders it dangerous for an authority responsible for a large area to make any extensive use of school records. In small areas where co-ordination of differing standards is easily accomplished by an inspector of the local authority, they play a much larger part.

While reports from individual schools cannot equate the merit lists of one school with those of another, much help may be given by schools in supplying order-of-merit lists of the children for whom they are themselves responsible. These lists may be used to settle border-line cases. For instance, if his school places John above Tom, and

the external tests place them almost on an equality, Tom should make way for John if there are not awards available for both. Dr Crofts, the Secretary of the Joint Matriculation Board of the Northern Universities, has told us[1] that many Secondary schools, suspicious of the use to which it might be put, were at first unwilling to furnish a classification of their candidates: others provided lists which were of little or no assistance, as the compilers of them clearly regarded all their geese as swans, classifying all as capable of reaching pass—in some schools, credit—standard. When, however, the use of a simple order-of-merit list was more clearly understood, an increasing number of schools submitted estimates correlating very closely with the examination results. We have been informed by one Head Master that the correlation between his estimated order of merit and that based on the whole School Certificate examination is never less than 0·8. It is not unreasonable to look for equally accurate order-of-merit lists from the Primary schools—which lists would be of great assistance to examiners, especially in deciding on border-line cases. In submitting their lists, Heads of Primary schools might at the same time report on any special points likely to be useful to an authority in making its decisions.

We may conclude, therefore, that written tests, oral interviews, intelligence tests, and school estimates can all play a useful, in some cases an essential, part in the selection of children for Secondary education. Which of these can safely be employed by any particular Education Authority depends largely on the numbers

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[1] *Education at Work*, ed Bompas Smith (Manchester Univ. Press) pp. 120-124, *passim*.

controlled by the Authority, on the personnel available for conducting the examinations, and so to some extent on finance. In the next chapters we shall deal in some detail with the conduct of written examinations in English and arithmetic.

IV

THE TESTING OF ENGLISH

THE remarks in this chapter will refer in the first place to tests planned to sort out the children most likely to profit by what is known as Secondary education. We have not had any experience of tests devised to sort out the other children as suitable for a Junior Technical school or for a Central or Intermediate school. Some of the problems dealt with here also arise in connexion with higher examinations such as the School Certificate, but the examination kept in view throughout has been that held to pick out those children who are considered most suitable for Secondary education. We do not wish it to be inferred, however, that we do not consider it possible to devise tests which could complete the sorting out of all the eleven- or twelve-year-old children, or that once the Secondary-school children have been selected the English test as here described has no more value. The particular type of English test to be used and the method of applying it depend in the first place on what post-primary education is available and on the school-leaving age. We will therefore in the main consider the testing of English from the point of view of selecting the children for the Grammar-school type of Secondary education, that is for a more or less academic type of education leading to the taking of School Certificate and Higher Certificate examinations, and later in general to non-manual occupations, training colleges, and universities

26

THE TESTING OF ENGLISH

What then are we to require in English of children who are to be classified as likely to profit by a Secondary education? Very briefly we may say that we require them to be able (1) to comprehend simple spoken English, (2) to read simple English with understanding, (3) to express themselves in simple continuous English prose. The requirement (2) follows on (1), so it may be assumed that if (2) is fulfilled (1) is also. Ability to do these things will of course be necessary in all children who are to pass on to any branch of post-primary education, but, broadly speaking, it may be said that the better children acquit themselves in tests devised to estimate such ability, the more likely are they to profit by a Grammar-school type of education. The majority of English tests now being used to grade this ability, excluding for the moment the short-answer tests, require the children (1) to write a piece of continuous prose, a composition or essay, on one of several set subjects, and (2) to answer questions on a passage of prose or verse, the questions being framed in the first place to test the children's comprehension of the passage, though others are also included to test, *e.g.*, grammatical accuracy or punctuation The latter test, number (2), will be referred to here as a comprehension test. Some examinations also include questions on vocabulary, sentence construction, formal grammar, and the spelling of given words

The short-answer questions are also usually designed to test comprehension of English, vocabulary, grammatical accuracy, and spelling. The one thing they cannot test is the ability of a child to clothe his ideas in simple *continuous* English prose. In our opinion this defect makes it undesirable to rely on this type of test alone.

27

Questions on formal grammar must be used with great caution. They are only admissible when all schools in the area concerned include the teaching of this branch of English in their syllabuses and use a uniform nomenclature. Even then it is doubtful if such questions test anything which cannot be tested by means of the comprehension test, and they certainly tend to test teaching rather than ability. It is always possible to include in the comprehension test questions which shall investigate the children's understanding of and ability to apply the essential principles of English grammar. Similarly the vocabulary of the children is tested in both the essay and comprehension tests, and there also seems but little sound reason for testing spelling separately. When we remember what we are seeking to discover about children in such examinations, it seems of doubtful justice or utility to attach importance to the correct spelling of words arbitrarily chosen by an examiner, and often chosen because they are "tricky" to spell.

The whole question of spelling as a criterion of ability bristles with difficulties. Opinions range from those which attach no importance to it to those which over-rate its importance. It is a fact that very many brilliant people never learn to spell English correctly, but these people will always pass their examinations in spite of this weakness: and it is equally true, as all who have had wide examining-experience will agree, that ability to spell such words as the children themselves use correlates very closely with general ability. In an examination which we conducted, the correlation of spelling-marks with those earned on the rest of the paper was 0·85. We have marked many thousands of examina-

tion papers written by children aged 10 and 11 without finding any cases of thoroughly good work being spoilt by really bad spelling With older children, at the School Certificate stage, however, such cases are fairly common, and great caution has to be used at that stage lest too much weight should be given to accuracy in spelling. Ability to spell should in any case be assessed on the candidate's own vocabulary and not, as is still done in many examinations for entrance to Secondary schools, on his ability to spell words arbitrarily chosen, many of which are of special difficulty and unlikely to be used by children of this age. In recent examinations we have seen, for instance, *accommodation, yacht, cruise, dyeing, parliamentary.*

It would appear, then, that the English examination may well be confined to (1) a short composition and (2) a comprehension test designed to test not only comprehension of the passage in detail but all or any of the following : grammatical principles and their application, vocabulary, sentence construction, spelling. It is not advisable that all these or others which could be suggested should be tested every year: variety and unexpectedness may be preserved by including some one year, some another.

(1) *Compositions.* The object of these is to test children's ability to express their ideas in simple continuous English prose. When the examination is held for two age-ranges, it may be well to ask the younger children to write only a paragraph, while expecting the older ones to write several paragraphs, each embodying a different aspect of their subject. This method has proved very successful in helping to overcome the difficulty of grading an English examination as between 10- and

11-year-olds. It is most essential that at least one of the subjects set for composition should be within the scope of every child, without any dependence on knowledge acquired at school or on particular home environment. Such subjects are "Describe the kitchen in your home," "A living person you admire," "The happiest day of your life": we have read many compositions on the first of these subjects which contained vivid and well-arranged descriptions, frequently tinged with humour or pathos, which lent this apparently ordinary subject real colour and life. Another such subject which appeared to be successful was "A dog or cat describes the people with whom it lives." This not only gave the less imaginative children something straightforward and within their experience that they could write about, but also offered opportunities to the more enterprising. Some of these, for instance, wrote most skilfully in the form of a broadcast talk. First the announcer spoke, then the animal began: "Hullo, everybody! Thomas Catt speaking. I'm going to tell you to-day about the queer people I live with . . ." Many cleverly stressed the animals' point of view, sometimes with disconcerting results. "My master thinks a lot of my mistress; he often calls her a cat" was supposed to be written by a cat. This may be contrasted with others in which wholly human standards prevailed: *e.g.*, "My master is a sweet man. He never passes a day without he cleans his teeth and his boots." Even politics crept in: "To my horror I found I had come to live with some conservatives, so I bit them all fiercely and of course found a new home as soon as possible." And one likes to regard the ending "So that is the end of my tail" as containing an apt pun rather than a spelling-mistake.

Yet another successful subject of this type was "Imagine you have a magic wand which you may use three times Describe what you would do " On this subject an eleven-year-old girl, in a really brilliant little essay, having first wished for no unemployment, no diseases, and no wars, gave a vivid description of watching the world improve as a result of her wishes. Yet the subject was also well within the power of the average children who had less ambitious but no less clearly defined wishes: *e g.*, "I should change my school into a good school, for magic wands are very powerful." The pathos of life in a mining-district with its unending stream of accidents was revealed in the composition of a miner's son who wished for "happy and peaceful deaths for all my family."

It is worth giving much thought to this question of composition subjects, for it is of vital importance in our task of discovering qualities not easily measured in any other way. In an examination of this kind, when the children are free from the self-consciousness which fetters them in their school exercises, they may reveal very much more about themselves than the degree of their ability to write English. In deciding the fate of border-line cases, therefore, it may be helpful to reread the child's composition from this more general point of view, though we are not suggesting that all the examples cited above were useful in this way. We have found ample evidence that most of the children feel free to set down their genuine opinions and thoughts, to show the way they themselves look at things; and the child with the unusual type of mind, a future thinker and leader perhaps, who may not score a high mark on the more or less mechanical tests, is often revealed

through unfettered composition. We know that professional football looms large in the homes of most of these children, but we were not prepared to find a boy showing that he felt there was something wrong about such values. He began a composition on "A famous living man or woman of any nation," which he devoted to Drake, of the Arsenal, thus: "Fame is a queer passing thing: if you say 'Drake' nowadays nobody thinks of Sir Francis, the English seaman." The subject "Doctors" revealed some individual points of view: "Doctors are very kind people. Sometimes they order the schools to close"; "I like men doctors better than women because I think *they* know what they are doing." On the subject "Your favourite lesson at school" we could have collected material for a dissertation on school methods and curricula, but these more weighty matters were refreshingly lightened by the expression of more individual ideas: *e.g.*, "I like history with our present teacher because his blood boils when the hero's did"; "I like writing-lesson, because then the teacher doesn't talk much"; "I like history best, because our history teacher is very beautiful and I like to look at her."

As long as we include one subject of the type described above, which shall give opportunities to all, the alternative subjects may be set to rouse the interest of more specialized minds. Many children delight to tell a story of adventure, and we have read some quite remarkable efforts on such titles as "The Broken Bridge," "An adventure in a fog or flood," "A real or imaginary dream." Others are more at home in description; others, again, like subjects which enable them to write about making things. There should not be too wide a

32

choice—three or four subjects at most—as a large number only confuses the children and wastes their time.

Great improvements have been made of late in the methods used for marking compositions. It may be said at once that marking on a general impression alone can never be just when it is necessary to employ a team of markers, and is unlikely to be so even when one person marks all the scripts. There are certain aspects of English composition which can be marked quite mechanically, and there are ways of marking the others which reduce considerably those variations of standard that are the chief weapon of all who oppose the use of a composition test, and the admitted difficulty of those who consider such a test essential. In Appendix B will be found a marking-scheme which has been gradually evolved as the result of experiments covering eight years. It is far from perfect, but it is hoped to improve it still more, and, used in conjunction with the standardizing method now to be described, it would appear to be a great advance on the old haphazard methods.

There is a slowly increasing body of opinion which favours the use of some kind of scale in the marking of compositions. These scales have been common in America for many years, but only lately have they been formally devised and used in this country. Briefly the method is for a body of examiners to discuss and come to an agreement on, or for a chief examiner to fix, the marking of a number of compositions representative of all qualities, but especially of the difficult border-line ranges, and to use these compositions as points on a marking-scale by which all the compositions to be

c   33

marked may be graded.[1] Fixed printed scales based on some such procedure are of great interest as showing the methods adopted in their construction, and may be of great use to examiners who are sufficiently interested in their task to wish to test the extent of their own agreement with them; but it is doubtful if they can be reliably applied to composition marking generally. The only completely reliable method is to construct a scale for each examination, based on the actual subjects set, the marking-scheme, and the reactions of the assistants who will be using it. Experience is always discovering means of improving marking-schemes, the employment of new assistants always revealing fresh sources of bad standardization which must be overcome.

The ideal method is rarely completely possible, as time limits are always controlling the conduct of examinations: the following procedure is not likely unduly to delay the completion of the marking. The chief examiner selects as large a number of compositions as can be coped with—from a still larger number which he has scrutinized—representative of various points on the marking-scale. The hopelessly bad and the exceptionally good are the least important (though they must be represented); those coming about half-way down the scale are the most important. Copies of these compositions (facsimile copies obtained by photography are the rarely attainable ideal)[2] are then sent to all the assistant examiners together with copies of the marking-scheme which has been drawn up by the chief examiner, and considered, perhaps amended, and

[1] See, for example, *The Northamptonshire Composition Scale* by Dr Perrie Williams (Harrap)

[2] The Joint Matriculation Board of the Northern Universities supply these.

finally approved by a large committee of experienced Secondary and Elementary teachers. Where marks are allotted for writing and/or general neatness, and where facsimile copies are not provided, these marks will also be given to the assistants. The assistants then mark the compositions and forward to the chief examiner their marks in detail according to the different sections of the marking-scheme. The chief examiner enters the marks up on one big sheet for comparative purposes, works out averages where such can be helpful, notes serious divergences of opinion and any other relevant matters. A meeting of the chief examiner and all the assistants at which all these points are discussed is then held, and an agreed mark is assigned to each of the sample compositions. The assistants and the chief examiner enter these marks on their copies of the sample compositions, together with any notes that they feel may be helpful. These copies thus constitute the marking-scale for that year to which all the compositions marked may be referred. Such methods are familiar to all examiners employed by enlightened examination authorities, but the fact that they are used is probably not known to very many of the general public, even to those interested in such questions.

We have kept records of one examination with a view to testing in the first place the value of gradual changes in the marking-scheme and secondly the degree of agreement on the marking of the sample compositions among assistants.

The number of compositions marked and the number of assistants employed are both comparatively small, so that the correlations given below are only reliable for the purpose of a comparison of the results of

one year with those of another   Briefly, the correlations are obtained by finding each examiner's order-of-merit list for the sample compositions and comparing this with a standard order—that of the chief examiner. It is not suggested that the chief examiner's standard of marking is alone correct, but it is usually about the average of that of the assistant examiners and it is ultimately the standard adopted at the border-line re-marking. For those who are not familiar with rank-correlations we may explain that if any examiner places the compositions in the same order as the standard order, the correlation is 1 ; if in an exactly reverse order, the correlation is − 1. In order to save space only the average, highest, and lowest of the correlations of all the examiners of each year is here given, instead of the correlations of each examiner.

RANK-CORRELATIONS	1931		1932		1933		1934		1935	
	Jun [1]	Sen [1]	Jun	Sen	Jun	Sen	Jun	Sen	Jun	Sen
Average	792	804	854	828	909	919	922	916	938	939
Highest	892	901	909	976	976	988	986	976	988	1 0
Lowest	658	668	713	643	774	855	785	794	819	806
Greatest number of positions in order-of-merit lists occupied by one composition	6	6	6	5	5	3	3	4	3	3
Least number of positions in order-of-merit lists occupied by one composition	3	3	2	3	3	2	2	1	1	1

It is pointed out that examiners may, by their numerical marking, agree as to the order of merit of a

[1] Juniors are ten-year-olds and Seniors eleven-year-olds

36

number of compositions, while differing (but not to any great extent) as to the exact mark to be allotted to each one.

Giving the utmost value to all the possibilities of error which may be attached to the above figures, it may still be concluded that (1) standardization of composition marking is by no means the hopeless task it has been thought to be, and (2) standardization has been steadily improving in this examination

It should be noted that the above results refer to marking done by the assistant examiners before discussion of the marking-scheme or sample compositions. Correlation should be even closer after that discussion.

Schemes for marking compositions will vary according to the nature, standard, and object of the examination concerned, but it will probably always be advisable to base them on three main sections: (A) Thought or ideas, (B) Structure, and (C) Mechanical accuracy. Of these, mechanical accuracy is much the easiest to assess, though even in this section great care must be taken with regard to such matters as the treatment of repeated mistakes, spelling of proper nouns, American forms of spelling, use of apostrophes, etc. One of the greatest difficulties in drawing up and applying a marking-scheme is in deciding the part to be assigned to punctuation, which on the one hand is inseparable from style or structure, but on the other hand may be purely a question of mechanics. The marking-scheme quoted in Appendix II has attempted to cope with this difficulty. Sections B and C do not vary very much with the type of subject set, but Section A does, and it is the varying character of this section that makes it advisable to have a fresh scale for each examination.

The chief difficulties in standardizing assessments under Section A are (1) that inexperienced examiners fail to realize that the compositions of children may be of a high quality without interesting the adult reader and that the adult reader must not expect to get new ideas from them, and (2) the widely divergent views on what is and what is not relevant to a given title. For example, candidates in a School Certificate examination were asked to write on "A Study of the Stars." A number of them gave detailed accounts of their favourite film stars Most examiners rightly accepted this as a perfectly legitimate, if disappointing, interpretation of the title: a few, however, until instructed otherwise would have penalized such attempts heavily. How are we to deal with compositions on "A famous living person" which deal with persons both recently and long since dead? A definite—though not too heavy—penalty must be assigned by the chief examiner, and the compositions after this deduction must be marked as if they had been strictly relevant. The ideal is to avoid subjects where such difficulties may arise, especially as a candidate may have made his task much easier for himself by misreading the title, may even reproduce something already written as a class exercise: but all experienced examiners know how almost unattainable the ideal is in this case, and how diabolically ingenious children can be in misunderstanding the examiner's intentions.

(2) *Comprehension Tests*. The value of these is undisputed. They are firmly established as an essential part of the great majority of examinations for entrance to Secondary schools, and their use is extending to School Certificate examinations. By no means their

least important qualification is the fact that they cannot be crammed for, or rather that the more children practise them the more does their ability to write and understand English improve. Three samples of such tests are given in Appendix *B*, but it may be interesting to examine one in detail to show the object of the questions set on it.

Read the following passage very carefully:

Along the trackless and uncharted airlines from the southern sun they came, a lone pair of swallows, arriving with weary and uncertain flight from over the wastes of the sea They rested on a gorse bush, their blue backs beautiful against the store of golden blossoms guarded by the jade spikes The last day of March had just blown with the wind into eternity. Symbols of summer and of loveliness, they came with young April, while the yellow celandines were still unbleached, while the wild white strawberry and ragged robin were opening with the dog violet. On the headland the flowers have a hard struggle for both life and livelihood, for the sward is cropped close by generations of sheep and the headland is swept by cold damp sea-winds. Perhaps the swallows hoped to nest, as their ancestors had done centuries since, in the cave under the precipice at the end of the headland, or perhaps love for its protection after the wearying journey was new-born in their hearts. One cannot say; but the pair remained there

Now answer the following questions from information which you can find in the passage:

(1) Make a list of all the words used to describe the colour of something, and opposite each word write the name of the thing it describes

1. This tested accuracy and observation Careless children omitted one or another, while unintelligent ones gave "violet" as a colour describing "dog."

(2) Write out from the beginning of the passage to "jade spikes," altering it so as to make it refer to one swallow only

2. Tested accuracy and grammatical forms The marking-scheme provided for deduction of marks for inaccurate copying.

(3) Describe the exact position of the place where other swallows had nested in the past

3. Exactness was again needed here, while really unintelligent children failed to identify the sentence in which they could find the necessary information.

(4) What happens to the colour of the celandine as summer approaches?

4. This was intended to test ability to extract the positive information from the negative of the passage, but the value of the question was impaired by the fact that country children could answer it from knowledge without reference to the passage.

(5) Give in your own words two reasons why it was difficult for flowers to grow on the headland.

5. "In your own words" was insisted on for a good mark, so that only those who really understood the reasons scored heavily. As, however, entirely wrong reasons were given by many children, some credit was given for merely selecting the right ones.

(6) Explain carefully the meaning of (a) trackless airlines, (b) the last day of March had blown into eternity, (c) centuries since.

6. This was the most difficult question, deliberately set to sort out the best candidates. Marks were carefully

graded, special attention being given to the question in re-marking the work of border-line candidates.

> (7) Say which of the following sentences are true and which untrue according to the passage. Correct the untrue sentences by altering *one* word only in each
>> (a) The swallows were very weary when they arrived on the headland.
>> (b) The swallows arrived at the end of April.
>> (c) The swallows had travelled in a southerly direction
>> (d) There were some flowers on the headland
>> (e) The grass on the headland was very long.
>> (f) There were no animals on the headland.
>> (g) The two swallows rested on a gorse bush

7. This proved a valuable kind of test of (1)accuracy: it must be read carefully in the first place, and the answer must be set out in such a way as to admit of no doubt as to the candidate's intentions; (2) of the extent to which the passage has really been understood; and (3) of constructive ability in correcting the untrue sentences by altering *one* word only. Careless and unintelligent children, for example, saw the word "April" in (b) and as the swallows came "with young April," put down the sentence as correct.

The marking-scheme is of the utmost importance in the task of extracting the highest grading-value from a comprehension test, and it must be drawn up only after an experimental marking of from 50 to 100 scripts representative of all qualities of work. If this is done with great care, and if the questions are suitable, standardizing of the assistant examiners' marking of such questions is a comparatively simple matter. It is important also to avoid questions which can be answered from a casual knowledge of facts (see Question 4 above),

for the inclusion of such may give marks to those who do not really deserve them. While it is advisable to begin with an easy question which all candidates feel able to attempt, it is important to avoid those on which a large proportion of the candidates will score full marks and to include some which shall be within the reach of only the most intelligent children.

This brings us to a very important point with regard to the setting of comprehension tests, and that is the necessity of having a try-out if the papers are to be completely successful. We have sometimes found it necessary to abandon whole tests which a try-out has proved unsuitable, and it has always been necessary to make many alterations in the paper as experimentally drafted. No other means such as reference to a reviser or consideration by a committee, even of experts, can ever replace the try-out as a vital factor in the production of a completely satisfactory test.

The essentials then of a successful examination in English (as a part only of the whole examination, a consideration of which involves other matters including arithmetic, age allowance, adjustment of marks between the two subjects, etc.) are:

(1) Suitable tests: these may well consist of a composition exercise and a comprehension test. For the composition a choice, but not too wide a choice, of subjects should be given, and one subject should be within the experience of every child. An essential of a successful comprehension test is that it should be tried out in some remote part of the country.

(2) Accurately standardized marking. This depends on (a) the marking-scheme—in the case of the composition this must be based on past experience, and in the

case of the comprehension test on experimental marking of scripts actually worked by the candidates; and (*b*) the methods adopted to standardize the marking of a team of examiners. Such are the construction of a marking-scale for compositions and the holding of examiners' meetings at which the details of the complete marking-scheme may be explained.

V

THE TESTING OF ARITHMETIC

GENERAL statements about teaching or testing arithmetic are of little value unless a definite content is given to the word "Arithmetic." Statements true of it in one of its aspects may be misleading or even untrue in another. Results derived from research into the working of one type of arithmetical test cannot always be applied to other types. The nature of the safeguards necessary in dealing with arithmetic as distinct from English marks is moreover altered if the spread of the arithmetic marks and the spread of the English marks are first equalized in some such way as that suggested on pp. 83-84.

Thus we begin by stating the content of the word "Arithmetic" as used in this chapter. It includes (A) habits of calculation: knowledge of addition, subtraction, multiplication, and division tables, and of their use in the ordinary standard types of sums. In this sense really good arithmetic depends on the formation of habits of quick and accurate calculation. It includes (B) knowledge of the arithmetical operation appropriate to a familiar situation which, in a test, is usually, but not always, embodied in words: *e.g.*, knowledge that the question "How many pages a day must be read of a book of 284 pages in order to finish it in 7 days?" requires division. "Arithmetic" also includes (C) power to attack the quantitative problem involved in a new situation, which may present more than one

44

aspect This is the power required as we grow up to face the problems of life. It depends to some small extent on having learnt good methods of attack from the solution of previous problems, but far more on innate mental capacity. Since the new situation in an examination paper is almost always expressed in words, (C) also depends on ability to make good sense of what one reads. Finally "Arithmetic" as used in this chapter includes (D) simple mensuration, which is the basis of geometry and which connects itself with many forms of handwork. In other words, the examples of (B) and (C), the familiar and the new situations, may be expressed diagrammatically rather than in words. Wide differences of opinion exist in this country as to which of these ingredients and what proportions of them rightly find a place in the arithmetic part of an examination for investigating the abilities of ten- and eleven-year-olds. In this chapter we express our own experience as to the most valuable form which such a test can take —this appearing to be the simplest method of contributing to a solution of the difficulties involved.

Ingredient (A)—frequently referred to as "mechanical arithmetic" because the more mechanical its working, the better its results—must find some place in the examination; Secondary schools have a right to expect some degree of attainment in this matter It is true also that the formation of these habits of simple calculation comes most easily between eight and twelve years of age. The inclusion of a small amount of such work in a test for even the ablest children is justified because of the stabilizing effect which it exerts on young minds required to concentrate in the unfamiliar environment of an examination room. This ingredient

would appear to be best tested by having a fair number of "plain sums" printed on the answer paper, ready for working. This avoids waste of time in copying under stress rows of figures from printed question paper to answer paper, and makes it more possible in 10 or 15 or 20 minutes to test speed as well as accuracy. The co-operation of the teachers in deciding the length of such tests is of the utmost value, while much can, of course, be learnt by a suitable try-out of the proposed questions on various small groups of similar children in another district.

In setting the questions, care should be taken that each of the four operations is tested to the degree of difficulty to be expected. This degree of difficulty would appear to be another matter for discussion and decision by a body of representative expert teachers in actual touch with such children in the years immediately before and after the examination. Care must be taken to avoid testing the same combinations of figures over and over again, the aim being to test as many as possible of those known to be more difficult. For instance, the division of numbers between 100 and 120 by 12, or the knowledge of the correct carrying-figure from such products as 108 or 110, should always be tested. If multiplication by 7 is tested and not multiplication by 8, it should be balanced by division by 8 rather than division by 7. These counsels are so obvious that one would not dare to mention them, were it not that some of the arithmetic test papers which from time to time have come to our notice have ignored them.

Some long tests of this type, set with no hope that any save an exceptionally able child can complete the

work in the time allowed, aim at including every pos-
sible combination of figures in the four operations.
This, it is felt, diminishes the element of luck, and gives
a wider spread of marks. Long tests of mechanical
arithmetic to be done in a short time are usually marked
on the basis of one mark for every correct figure in the
answer. The shorter type of test allows 2 or 3 or 4
marks per question as a maximum, and gives either the
maximum mark or zero, this being a definite recog-
nition of the fact that an arithmetical calculation is
right or wrong as a whole, its strength the strength of its
weakest link.

Ingredient (B)—knowledge of the type of arithmetical
calculation demanded by a given familiar-life situation
presented practically, or embodied in words—depends
far less on good teaching than does (A). Capable
children on their own initiative join the real ex-
periences of life to their figuring: good homes teach
small children quite a lot of simple arithmetic of this
type: it is the average or dull child from the poorer
environment who most needs to have his school arith-
metic connected with the affairs of everyday life.
Some schools still teach to excess long mechanical sums,
and set far too few short questions of the (B) type, e.g.,
"What is the total cost of taking 35 children to the sea-
side, at a cost of 3s. 8d. each?" It is, however, much
rarer than it was twenty years ago to find nonsensical
answers to such questions. Children now rarely add
when they should subtract or multiply, and multiply
when they should divide. In most schools (B) is taught
from the earliest days concurrently with (A), usually by
questions which involve only the easier calculations. In
an examination, a separate paper in mental arithmetic

47

affords the simplest means of testing the candidates' powers of selecting the operation appropriate to the question proposed. In such a paper, in which normal children find the answers "in their heads," selection of the correct operation can be tested in a good many different instances without any waste of time. See, for example, the sample paper on p. 167. Here the candidates are presented with a number of questions printed with a space opposite each in which to insert the answer. It may, in passing, be noted that this requires a different mental process from that required by certain types of numerical questions included in intelligence tests, where several answers are set down opposite the question, and the candidate has to select the correct one. The type of arithmetic test here suggested asks for a solution, not for a choice of the correct solution from among others: the question is presented in an "inventive," not in a "selective," form. The questions in such a test are easily marked, as, with rare exceptions, the mark is all or nothing, while the maximum is small, seldom more than 2 marks. If the questions are graded from very easy to difficult—to allow of all children becoming at once happily engaged with the test—the first questions may well score 1, the intermediate ones $1\frac{1}{2}$, and the most difficult ones 2, the higher mark corresponding with the greater amount of time reasonably required. Such marking of such a test gives a very good spread of marks, discriminating well between differing degrees of capacity and achievement among the candidates. Enough items must be included to demand some degree of speed, but very long questionnaires would appear to be better suited to older people than to ten- or eleven-year-olds: on many such

48

they have a devastating effect. Here again the counsel of teachers representing different types of schools and methods of teaching is invaluable, especially if combined with a careful try-out of the kind and number of the questions on similar children in a different district.

The inclusion of a separate mental test in an arithmetic examination is, however, by no means universal, and it is by no means the only method of testing ingredient (*B*). Wide differences as to principle are evident, resulting in real variations in the balance of the different parts of an arithmetic examination. Granted then that (*A*) and (*B*) as defined on p. 44 are distinct ingredients, granted also that questions which can be done "in the head" and those which necessitate some writing can *in general* be distinguished (a distinction applicable, say, to 90 per cent. of the candidates), in what way can we best apply these distinctions to the technique of examining? A good many authorities make no attempt to test mental work separately: of these some insert into the paper questions easily soluble mentally and make it clear to the candidates that answers to these questions if correct, although unaccompanied by any working, will receive full marks. All who do not test mental work separately argue that good habits of mental work earn marks for a candidate throughout his paper, by reducing the amount of his written work to the necessary essentials: those who mix mental questions among others argue that ability to decide whether a question is better solved mentally or by written work is evidence of capacity in a child, and that to have a separate mental test rules out this evidence. For some the time element or the financial element is the deciding factor. It is impossible to give

a separate mental test unless there is money to print separate question papers, preferably with clearly marked spaces for the answers, and also time to collect these before proceeding with the remainder of the arithmetic examination.

We have had some years of experience of examining about fifteen thousand picked candidates by such a paper in general arithmetic—with *one* printed question paper, one blank answer book, and a maximum time of 55 minutes. Below is a sample of those set for ten-year-olds.

ARITHMETIC

55 MINUTES ALLOWED
Work as many questions as you can

PART I

In Part I you will receive full marks for each correct answer, whether you show written working or not. Any working done must be in your Answer Book.

1. How much does a man earn by working 16 hours at 1s. 4½d. an hour?

2. Write in figures the number which is twenty-five less than three-quarters of one thousand.

3. Divide 17 cwt. 3 qr 16 lb. by 12.

4. A family uses 3 pints of milk every day with an extra pint on Saturdays   What is the weekly milk bill when milk costs 6½d. a quart?

5. A large square of paper is divided into 16 small squares by drawing lines down and across it. How many lines are drawn?

6. Find the difference between 0·86 × 7 and 48·4 − 8.

PART II

In Part II be careful to show HOW you work each sum.

7. A woman received £14 2s. 4d. from the sale of girls' dresses, coats, and caps. She sold 8 dresses at 15s 11d each, and 6 coats at 23s. 9d. each. If the caps were sold at half-a-crown each, how many caps did she sell?

8 The sketch shows a box tied up with string, put twice round the short way and once round the long way. The box is $9\frac{1}{2}$ inches long, $4\frac{3}{4}$ inches wide, and $2\frac{1}{2}$ inches high.
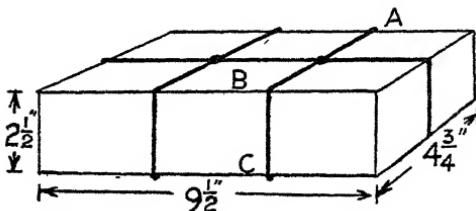
(a) How many inches of string are needed to stretch once round the box the short way—from A to B, from B to C, then underneath the box, then up the back to A?

(b) If knots and a loop used an extra $8\frac{1}{2}$ inches of string, how many inches of string altogether have been used to tie up the box?

9. How many words are there altogether in a book of 240 pages, if you reckon that one-tenth of the pages are only half full? Count 11 words to a line, and 36 full lines to a full page.

10. A 1-oz. skein of knitting-wool is tightly stretched round two pegs fixed 27 inches apart In order to wind the wool into a ball, you have to go round the pegs 88 times

(a) How many yards of this wool weigh one ounce?

(b) What is the weight of 3 miles of this wool?

As will be seen when we come to consider the testing of ingredient (C)—attacks on fresh problems—since marks must be given for methods of attack or of partial attack, the child's work cannot be properly estimated unless in these questions he sets down some working. It follows that just as there are parts of the paper in which we want to discourage unnecessary writing, so there are parts of the paper in which writing must be encouraged, even demanded. With the great majority of the candidates, however, the difficulty has been not to secure written work when demanded, but to avoid it when undesirable It has, in fact, been found that in

quite half the scripts worked by these selected children, mental work was completely absent, the children even being taught in the schools always to set down full working "in case you make a mistake." Adults who were badly taught in their own youth and who can never overcome their own handicap in the matter of mental arithmetic, adults to whom writing is easy and helpful, thus impose their own experience on children whose minds can easily be trained to a happy facility in mental work and for whom writing often hides rather than reveals the successful lines of advance. This imposition of adult experience on children militates against their chances of success. It would appear to be impossible to encourage the teaching of mental arithmetic in some schools, or to test it and with it the child's real capacity in a certain direction, unless a separate mental test with a time limit is made an essential part of the whole examination in arithmetic. There is also no means of testing ingredient (B) comparable in scope or speed with the mental or short-sum test accompanied by a time limit, for this examines not only the speed and accuracy of a child's mental calculations, but his ability to select the right arithmetical operation without wasting time in carrying out complicated calculations.

Ingredient (C)—power to attack the quantitative problem presented by a new situation—frequently finds but a small place in arithmetical tests devised for our present purpose. Too often the problems set are similar in type to the usual text-book problem, not unfamiliar in their setting, but only in the figures to be used for the calculations: ingredients (A) and (B) are thus again tested. Sometimes problems, except those

simple ones admitting of inclusion in a short sum or mental test, are omitted altogether, as in the Northumberland and other short-answer tests. The reason given for this omission may be that they are not, properly speaking, arithmetic, but tests of the intelligence required to apply technical arithmetic to life, or tests of reading and of ability to separate relevant from irrelevant data. Another reason given is that it is impossible to mark arithmetic problems of this type to one standard: with this statement our own experience and that of many others disagree.

The fact remains that, if fresh situations can be found, expressible in clear, unambiguous language, involving the type of arithmetical calculation with which the child of the age-in question may be expected to be thoroughly familiar, nothing in arithmetic so well discriminates between the mediocre, the able, and the very able candidates. It may be noted in passing that many a promising problem has to be jettisoned because no amount of effort, even co-operative effort by examiners, administrators, and examination council, can express it in words both unambiguous and sufficiently simple for children of ten or eleven years of age. After some years of experience with the setting and standardized marking of this kind of problem in many thousands of scripts, the chief examiner is heartened by the appreciation of the value of such questions as expressed by the great majority of those experienced teachers who have served as assistant examiners. It has been remarked that such tests are "infected with intelligence" What is wanted is not so much to test the child's powers in technical arithmetic as, through arithmetical tests, to add one more line of evidence as to a child's general ability and

what might be called the colour of his personality, with a view to giving him the most suitable type of post-primary education. For instance, the quality of a child's persistence in effort is thus tested. At the end of this chapter we give examples of such problems, and also examples of ingredient (D)—simple mensuration—as involved in situations hitherto unfamiliar to the child. The only valid reason for adding these to an arithmetic test is to afford yet another line of evidence on which to form a sound judgment, evidence whose prognostic value for mathematics and some branches of science is well worth consideration. It is noteworthy that such questions bring to the forefront a rather different personnel from that brought forward by the fresh problem expressed solely in words.

Side by side with these sample problems we give a marking-scheme for each. A complete set of arithmetical papers with which we have been concerned will be found in Appendix C, p. 167, together with a complete marking-scheme. That set of papers represents a half-way house towards the more modern ideas of the separate testing of the various ingredients.

These sample marking-schemes for any particular question and for the balance of marks as between question and question, or section and section, are based on a consideration of the solutions actually received from the candidates and are not settled in advance of the examination By the time that from fifty to a hundred scripts have been cursorily examined, the chief examiner can draw up a first draft of what will ultimately become, after many changes, the accepted marking-scheme. These first scripts are then marked provisionally, with another hundred or so; during this marking the first

draft continually undergoes alteration in some of its aspects as fresh methods of solution or examples of what will be "frequent errors" appear. When the chief examiner has drafted the best scheme of which he is capable at this stage of his work, it is considered by a large committee of experienced Primary and Secondary teachers, who have powers to alter and settle the scheme for the examination in question. In this form it goes out with their scripts to the assistant examiners, who use it for the preliminary marking of some thirty scripts and of some thirty to forty sample answers to different questions of a type likely to cause difficulty to the examiner; these have been selected from candidates' scripts by the chief examiner and duplicated for distribution to the assistants. A few days later all the examiners meet and discuss the marking of these samples and also any difficulties which have arisen in their preliminary marking of scripts. The examiners have no power to alter the scheme as passed by the large committee, but they can decide on the marking of any fresh points which have arisen, and on the method of applying the scheme to solutions difficult to assess. By this standardized and agreed marking-scheme, supplemented by the agreed marking of the set of sample answers considered at the examiners' meeting, each assistant examiner completes his marking. The best examiners all come within a maximum divergence of 4 per cent. from the chief examiner's standard. For a fuller discussion of this see pp. 72–76.

It is true that some examiners do fail to mark one or more of such problems to a standard, so that parts of their scripts have to be re-marked by the chief examiner. A few are not sufficiently intelligent or imaginative to

see what thinking lies behind a child's written expression of his work· even the ablest examiners have been puzzled for a time by the weirdness of the solution of a problem by an eleven-year-old. Often those who cannot cope with the complexities of the thinking of some eleven-year-olds do well in marking the problems of ten-year-olds. A few examiners are regrettably unable to advance beyond the old conception of "all or o" marking. When a child makes a calculation error early in a problem, or presents a piece of good thinking which, however, omits one difficult point (inserted in the problem for its diagnostic value), such a marker stops there and then, so avoiding the necessity for pursuing a troublesome calculation to its bitter end. Some of this may on rare occasions be due to bondage to the old idea that arithmetic is easy to mark as compared with English, or to failure to realize that marking arithmetic for the purpose of discrimination between candidates is different in principle from marking arithmetic to improve the individual's work in it; examination and school marking have different ends in view. Such examiners are helped towards standardized marking of problems by incorporating in the marking-scheme "frequent wrong answers" with a definite allocation of marks. More hopeless is the fact that a very few are not conscientious enough to be good markers to a fixed standard. When a child in stress and haste lapses into hieroglyphic figuring, and yet reaches the correct or almost correct conclusion, an examiner, even one who has already proved himself to have enough intelligence and imagination for good marking, may in his haste award zero: we ourselves have had on occasion to use a magnifying lens.

TESTING OF ARITHMETIC

SAMPLE PROBLEMS AND MARKING-SCHEMES

I. Ten-Year-Olds

Calculation Errors· In problem questions deduct 2 marks for each
calculation error, but not more than 6 marks in any one
question

SAMPLE 1

A bucket when empty weighs $1\frac{3}{4}$ pounds The bucket when full
of water weighs $15\frac{1}{2}$ pounds We know that a pint of water weighs
$1\frac{1}{4}$ pounds.
  (a) What is the weight of the water in the bucket?
  (b) How much water is in the bucket? Answer in gallons,
quarts, pints

		marks		
(a)	$15\frac{1}{2} - 1\frac{3}{4}$ (idea) .	3	*Common error in* (a)	
	$13\frac{3}{4}$ pounds .	2	$15\frac{1}{2} - 1\frac{1}{4} = 14\frac{1}{4}$ Allow 2	
		5	marks	

		marks
(b)	$13\frac{3}{4}$ divided by $1\frac{1}{4}$ (idea) . .	2
	$55 - 5$ *or* $\frac{55}{4} \times \frac{4}{5}$ *or* 220 oz $- 20$ oz $= 11$ pints	3
	11 pints $= 1$ gallon 1 quart 1 pint	2
		7

Alternative to (b)   marks

  1 gallon weighs 10 pounds   .   2
  1 quart weighs $2\frac{1}{2}$ lb. (explicitly or implicitly)   .   1
  Therefore 1 gallon 1 quart 1 pint   .   4

Incomplete answers to (b)   marks

  1 gallon 3 pints or 5 qts 1 pt.   Maximum   6

Common errors in (b)   marks

  (1) $13\frac{3}{4}$ *pints* changed to gallons   Maximum   2
  (2) $15\frac{1}{2} - 1\frac{1}{4} = 1$ gall. 2 qt $\frac{2}{5}$ pt.   Maximum   2
  (3) $(15\frac{1}{2} - 1\frac{1}{4}) - 1\frac{3}{4} = 1$ gall. $\frac{1}{7}$ pt   Maximum   2

TOTAL MARKS $= 5 + 7 = 12$

SAMPLE 2

A boy went to the pictures one afternoon. The show began at
2.15 and ended at 4.20 The programme was (1) the news, lasting

15 minutes, (ii) an interval of 2 minutes; (iii) a comic picture, lasting 35 minutes; (iv) an interval of 6 minutes; finally (v) a long adventure picture

(a) How long did the adventure picture last?

(b) On this afternoon, the lights failed for a moment exactly half-way through the adventure picture   How many minutes to four was it then?

marks

(a)	2 15 to 4 20 . .	2
(b)	Other items, 58 min	2
(a–b)	Idea . . .	2
	67 minutes or 1 hr 7 min .	2
		8

Alternative I

Start of advent 3 13	4
3 13 to 4.20 .	2
67 minutes . . .	2
	8

Alternative II

2 15 to 4 20 . .	2
125 — 15, 110 — 2, 108 — 35, 73 — 6, 67. .	6
	8

If sequel 125 — 67, deduct 2 marks.

Alternative III

Counting back each item from 4.20 to reach 3.22 .	4
Time = time 2 15 to 3 22	2
67 minutes	2

Frequent Error

Subtract 58 min. from 2 15, 1 hr. 17 min. Maximum	2
Then accept (b) if correct	

Warning

An answer of 67 minutes obtained by *absurd* working	0

(b)	$\frac{1}{2}$ of 67 = $33\frac{1}{2}$	2
	$33\frac{1}{2}$ back from 4.20	2
	$13\frac{1}{2}$ min. to 4	4
		8

58

TESTING OF ARITHMETIC

Alternative to (b)

$33\frac{1}{2}$ min.	.	2
$33\frac{1}{2}$ min, on from 3 13 (idea)	. .	2
$3.46\frac{1}{2}$		2
$13\frac{1}{2}$ min. to 4 . . .	.	2

TOTAL MARKS = 16   8

SAMPLE 3
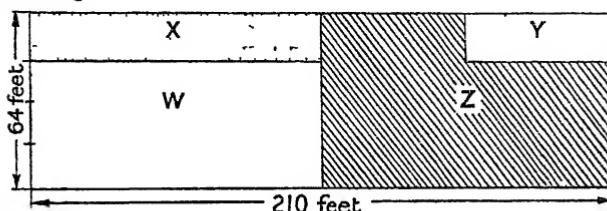
This is the plan of a piece of ground 210 feet long and 64 feet wide. Each side is divided into quarters, and the ground is divided into the four parts marked W, X, Y, Z

How many square feet are there (*a*) in X? (*b*) in Y? (*c*) in Z?

marks

(*a*)   Area of X as 105 × 16 *or* 13,440 − 8   .   .   4
                                    1680 square feet   .   .   2
                                                                           6

(*b*)   Area of Y as half of 1680 *or* $52\frac{1}{2}$ × 16
                              or   13,440 − 16   .   4
                                    840 square feet   .   2
                                                                           6

(*c*)   Area of Z as Y × 7 *or* X × $3\frac{1}{2}$ *or* 105 × 64 − Y
                    (6720 − 840)
        or 105 × 48 + Y (5040 + 840)
        or $52\frac{1}{2}$ × 64 + $52\frac{1}{2}$ × 48 (3360 + 2520)   .   .   4
        5880 square feet   .   2
                                                                           6

Partial Attempts   Allow 1 mark each to 105 ft and 16 ft   Allow 2
        marks to $52\frac{1}{2}$ ft , if no allowance for 105 ft., or 1 mark, if 1
        mark already given to 105 ft.
            Area of whole = 210 × 64 sq. ft. = 13,440 sq. ft , allow
        2 marks

        TOTAL MARKS = 6 + 6 + 6 = 18

SELECTION OF CHILDREN

A boy is saving to buy a bicycle. At the end of 1933 he had in his money box £1 12s. $4\frac{1}{2}d$ On the first day of every month since then he has put two florins into his box.

(*a*) How much has he still to save to buy a bicycle costing £5?

(*b*) If he goes on saving at the same rate, in which month of this year will he have enough money to buy his bicycle? [1]

(*a*)		marks		(*b*)		marks
14 additions		2		11s $7\frac{1}{2}d$ — 4s		
4s. × 14 = 56s		2		(idea)		2
56s + £1 12s. $4\frac{1}{2}d$		2		3 payments		2
£4 8s $4\frac{1}{2}d$		2		May		2
£5 — £4 8s $4\frac{1}{2}d$		2			TOTAL	6
11s $7\frac{1}{2}d$	.	2				
	TOTAL	12				

Alternative I   marks

(*a*)	12 additions for 1934	.	.	.	.	.	0
	4s × 12 = 48s		.			.	2
	48s + £1 12s $4\frac{1}{2}d$			.		.	2
	£4 0s $4\frac{1}{2}d$.	.	.	.		.	2
	£5 — £4 0s. $4\frac{1}{2}d$				.	.	2
	19s. $8\frac{1}{2}d$.				.	.	2
	19s $7\frac{1}{2}d$. — 8s for Jan Feb 11s. $7\frac{1}{2}d$		.	.		.	2
							12

(*b*)	19s $7\frac{1}{2}d$ — 4s. (idea)		.	.	.	2
5 payments			.	.		2
May	.		.		.	.	2
						6

Alternative II

	marks		(*a*)		marks
£5 — £1 12s $4\frac{1}{2}d$	2		14 months	.	2
£3 7s. $7\frac{1}{2}d$	2		4s. × 14 = 56s.		2
£3 7s $7\frac{1}{2}d$ ÷ 4s.			£3 7s $7\frac{1}{2}d$. — 56s.		
(idea)	2		11s. $7\frac{1}{2}d$.	.	2
17 contributions	.	2			8
May of this year	.	2			
	10				

TOTAL MARK = 18

[1] This question was set in Feb 1935.

TESTING OF ARITHMETIC

II. Eleven-Year-Olds

Calculation Errors In problem questions deduct 2 marks for each
calculation error, but not more than 6 marks in any one
question

Sample 1

A boy is beginning to attend a Secondary school If he travels
by bus, the cost is $3\frac{1}{2}d$ a day. School meets five days a week for
forty weeks of the year

To avoid the bus fares, his parents buy him a bicycle costing
£5 5s What will be the saving if he attends this school for five
years? 6s a year must be allowed for repairs to the bicycle and
12s a year for extra clothing.

		marks
A.	$3\frac{1}{2}d.$ × 5 × 40 (idea)	2
	£2 18s. 4d × 5 (idea)	2
	Or for $3\frac{1}{2}d$ × 1000 (idea) give 4 marks	
	£14 11s. 8d	2
B.	18s × 5 (idea) . 2 marks *or* 6s × 5 and 12s × 5 (ideas)	
	1 each .	2
	£5 5s. + 18s. × 5 (idea) *or* £5 5s + 6s × 5 + 12s.	
	× 5 (idea)	2
	£9 15s.	2
C.	Subtract B from A (idea) . .	2
	£4 16s. 8d. . . .	2
	Total Marks =	16

Alternative Method

	marks
$3\frac{1}{2}d$ × 5 × 40 (idea) . .	2
£2 18s. 4d. — 12s — 6s. (idea) .	2
£2 0s. 4d × 5 (idea)	2
£10 1s 8d . . .	4
£10 1s. 8d. — £5 5s. (idea) . .	4
£4 16s. 8d.	2
	16

Frequent Errors

(1) $3\frac{1}{2}d$ × 7 = 2s $0\frac{1}{2}d$. Bus costs £20 8s. 4d Saving is
£10 13s 4d Deduct 2 marks for a misreading.

SELECTION OF CHILDREN

(2) Cycle costs = £5 5s. + 12s + 6s = £6 3s   Maximum for stage B is reduced from 6 marks to 2 marks

If cycle costs are given as £6 3s × 5, maximum for B is 3 marks.

If cycle costs are given as £4 10s. (cycle itself omitted), maximum mark for B is 2, unless the answer clearly states a saving *in expenses* in which case allow B a maximum of 4.

SAMPLE 2

The ticking used to make 1 bolster-case and 2 pillow-cases weighed $2\frac{1}{4}$ lb. After being filled with feathers, the bolster weighed 4 lb. 10 oz., and each pillow weighed 2 lb $8\frac{1}{2}$ oz.

How many ducks must have been plucked to fill the bolster together with the 2 pillows, if a score of ducks give $1\frac{3}{4}$ lb. of soft feathers?

(a) *Weight of Feathers*   *marks*

The three weigh 9 lb 11 oz	.	2
Feathers weigh 9 lb. 11 oz. − 2 lb. 4 oz. (idea)	.	2
7 lb. 7 oz	.	2
		6

If 12 oz. (one-third of 2 lb 4 oz.) for each, deduct 2
Accept 18 oz. for bolster, and 9 oz. for each pillow.

(b) *Number of Ducks*   *marks*

Any correct method, explicit or implicit	.	Allow			4
Result = 85 ducks	.	.	.	.	6
					10

Allow (b) full marks if correctly deduced from any result for (a).

If method for one step only (e g $4\frac{1}{4}$ for $4\frac{1}{4}$ *score*) allow 2, with 2 marks for correct result.

If fraction is treated approximately in the working, maximum is 10 − 3, or 7.

If fraction is ignored or treated nonsensically, maximum is 10 − 5, or 5

If answer is fractional, deduct 1 for *foolish* final approximation.

TOTAL MARKS = 16

TESTING OF ARITHMETIC
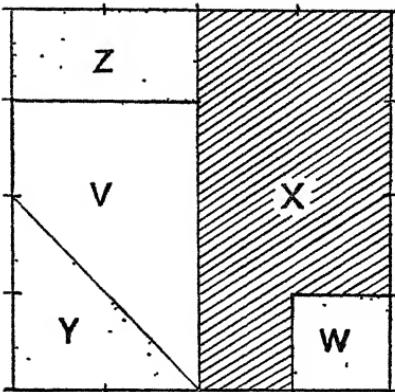
This is the plan of a square piece of land. Each side is shown divided into quarters. The land is divided into five parts: V, W, X, Y, Z.

(a) If Z is rented at £11 7s. 6d a year, what should be the yearly rent of X at the same rate?

(b) What fraction of the whole square is (i) W? (ii) X? (iii) Y?

			marks
(a) £11 7s. 6d. × 3½ (idea)	.	.	5
£39 16s. 3d.	.	.	4
			9

Alternative Method

£11 7s. 6d. — 2 (idea)	.	.	2
£11 7s. 6d. — 2 × 7 (idea)	.	.	3
£39 16s 3d.			4
			9

Frequent Errors in (a) | | | marks

(1) £11 7s 6d × 1¾, 2¾, etc.	.	. Maximum	4
(2) £11 7s. 6d. × 4, 7, etc. .		. Maximum	2
(b) (i) one-sixteenth	.	.	2
(ii) ½ — ⅛ *or* W × 7 (idea)		.	2
seven-sixteenths .	.	.	2
(iii) one-eighth . . .	.	.	3
			9

If *no* reasons are given, deduct 2 marks only   less if (*b*) is unfinished   Accept diagram divided to show sixteenths as adequate reason

In case of wrong answers, where the ratios are 1   7 . 2, allow 2 marks

$$\text{TOTAL MARKS} = 9 + 9 = 18$$

SAMPLE 4

A van, strong enough to carry half a ton, carries a driver, weighing 11 stones, and milk-bottles, each containing $\frac{1}{3}$ pint of milk   The bottles are packed in cases, 2 dozen to a case.

A case with 2 dozen empty bottles weighs 15 pounds, and the weight of the milk is 1 29 pounds per pint.

What is the greatest number of full cases which this van can carry safely?

		marks
A.	Weight available = $\frac{1}{2}$ ton — 11 stones (idea) .	2
	966 *pounds*	2
B.	Weight of milk in a case = 1 29 × 8 or 1·29 — 3 × 24	
	(idea) . .	2
	Total wt of a case· 10 32 + 15 (idea) .	1
	25 32 *pounds* . .	2
C.	966 divided by 25 32 (idea) .	2
	Correct division . 38 1 *or* 38 r 3 84 .	4
	Safe for 38 *cases* . .	1

$$\text{TOTAL MARKS} = \overline{16}$$

Alternative to Stage B   *marks*

15 lb — 24 = 10 oz per bottle	1
Milk 0 43 lb. *or* 6 88 oz per bottle .	
Case with Milk: 16 88 oz × 24 *or* 1·055 lb. × 24	
(idea)	2
405 12 *oz.* or 25 32 *lb.* . .	2

Frequent Errors

966 divided by 10 32 . 93 cases .	Maximum	13
966 divided by 15 . 64 cases .	Maximum	8
1120 divided by 25 32 : 44 cases .	Maximum	13
1120 divided by 10·32 . 108 cases .	Maximum	10
1120 divided by 15 : 74 cases .	Maximum	5

64

VI

THE MECHANICS OF STANDARDIZED MARKING

In the last two chapters references have been made to some of the difficulties met by chief examiners for English and arithmetic in ensuring that assistant examiners shall mark candidates' scripts with uniform fairness and good judgment. Stress has been laid on detailed marking-schemes based on the investigation of scripts already marked by the candidates (see pp 41, 54–55), on the advisability of having these schemes revised by experienced persons other than the acting examiners, on the necessity of full conference between the chief examiner and his assistants a short time after they have begun the marking of the question paper concerned, on the part played in English by the development of a certain kind of composition scale (see pp. 33–35) and in arithmetic by a set of sample answers to problems, marked to a fixed standard by the examiners at their conference (see p. 55). Hints have been given that, even with all these precautions, the problem of safeguarding the candidates against vagaries in the examiners' standards has not been completely solved. Even the most conscientious and experienced examiners make mistakes in their marking. A question may be omitted, a right answer marked wrong or a wrong right, a slip made in adding the detailed marks for the different parts of a question The effect of fatigue or personal trouble or undue haste on any person's marking is to make it somewhat less reliable. If, in order to obtain fresh blood among the

E

examiners or to spread the experience of marking over as many teachers as possible, a certain number of new assistants are added each year to the examiners' panel, and all of these are tried in the first subsequent examination, there are sure to be inequalities of standard and even errors due merely to inexperience. New teacher-examiners find it difficult to realize that school marking for educational ends and examination marking for administrative ends are two different jobs, the best teacher being by no means the best examiner in a public examination. The school examination desires to improve the pupil's work, the public examination to discriminate among candidates who at one part of the order-of-merit list are apt to be much of a muchness.

Some of the precautions commonly taken to minimize these irregularities have not yet been mentioned   Taking it for granted that it is not easy to standardize the marking of essays and problems, while refusing to admit its utter impossibility or even its undue difficulty, chief examiners include in the questions they ask a good deal of material which is very easily marked · the schemes for such parts of the papers are practically fool-proof, and it is a poor assistant who fails there even on his first attempt. Mechanical marking of a considerable part of both arithmetic and English papers is very desirable. The limiting of completely new examiners to a number not exceeding one-third of the total of assistants is also desirable, as it affords time for paying special attention to the marking of the inexperienced and hitherto un-tested. Careful records of examiners' marking from year to year and of the amount of re-marking of their scripts found to be necessary by the chief examiner, together with the power vested in the chief examiner of

66

selecting assistants from a panel, help to keep up the standard of the acting examiners' work.

Another precaution usually taken is to insist that all examiners, chief and assistants, shall enter on the schedules provided the marks they award for each question in each script as well as the total marks. It is easy to make mistakes in entry and addition, and in School Certificate examinations a whole army of temporary clerks (usually undergraduates on long vacation) is introduced to check up this part of the examiners' work. In examinations for entrance to Secondary schools less money is usually available, and simpler methods have to be adopted. A fool-proof method is to add the marks on the actual scripts as the end of each is reached from end back to beginning and enter total on front page of script, then in entering marks from script to mark-schedule, begin with the first page, enter each question's mark under its appropriate heading; finally add the marks across from first to last and then enter the total in the totals column. If the two totals agree the chance of any error is next to nothing. Very rarely indeed are cases found of marks being entered against the wrong candidate: one piously hopes that such cases have always been discovered. It is usual too to insist that all errors in a script shall be clearly indicated by the examiner, and that in questions made up of several parts, the detailed marks as well as the total mark for the question shall be clearly shown on the script It is also necessary to insist that the method of indicating on the marks-schedule that a question has been omitted should be different from the method of indicating that the question has been attempted but that the answer is worth no more than zero. It is then possible to make

67

investigations into the suitability or popularity or difficulty of individual questions These apparently trifling points all make for safety in the ultimate result.

Yet another precaution is to insist that assistant examiners shall mark a minimum total of about five hundred scripts or parts of scripts. Distributions of the marks gained by such a number follow a fairly steady arrangement, vagaries due to chance being comparatively small Very few obtain either very high or very low marks · the greatest number obtain marks about the middle or, in the case of a severe test, slightly below the middle : the other results are crowded more or less closely about this central mark In a large examination, in which each assistant marks about five hundred scripts, and the chief examiner about one thousand similar scripts, each marker makes a return of the results of his marking thus :

ANALYSIS OF MARKS OF JUNIOR CANDIDATES IN ENGLISH

MARKS	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100	TOTAL No OF CANDS
Cands A	1	8	15	40	48	46	34	12	6	2	0	212
Cands B	0	5	17	31	48	54	40	19	7	0	0	221
Cands C	1	4	6	14	17	11	9	4	1	1	0	68
Totals	2	17	38	85	113	111	83	35	14	3	0	501
Per cent of Cands	0 4	3 4	7 6	17 0	22 5	22 1	16 6	7 0	2 8	0 6	0	100
Comparable Central Marking	0 5	4 1	7 8	16 6	20 9	20 2	17 6	8 1	3 0	1 2	0	100

This means that this examiner, say, Mr X, marked 113 scripts whose marks came between 40 and 49: these 113 (l. 5, column 6) scripts were 22·5 per cent. of the

total scripts he marked. The corresponding figure for the chief examiner's marking was 20·9 per cent , which means that 20 9 per cent of the seven or eight hundred scripts already marked centrally had marks between 40 and 49. This last row of figures is an indication to the assistant of the central standard. If his own distribution of marks is very different from the central one, he is likely to have made some mistake in his marking which he may discover for himself before sending his scripts in, especially if he has already had some experience of standardized marking. It may be, however, especially in the case of the smaller variations from the central standard, that the sample sent him to mark came from a much less representative area than the scripts marked centrally In the examination used as an illustration, the latter are specially selected so as to give in the right proportions scripts from rural, mining, non-mining, industrial, and other urban districts. In any case the comparison of his own distribution of marks with the central distribution gives the assistant examiner a check on his own work and provides the means whereby the chief examiners may begin to study his results with a view to bringing them, if necessary, into as complete harmony as possible with those from the rest of the area.

Different methods are in use for harmonizing the results of a number of examiners each marking part of a large total of scripts. Where only from two to five examiners are involved, and these are selected for their skill and experience, a well-devised marking-scheme together with close co-operation and conference during the actual marking is sufficient to ensure standardization of the results. Where eight or twelve or twenty assistants are involved in one paper, the matter is dif-

ferent. All the methods used depend in the first place on a comparison of the distribution of the assistants' results with the distribution of the chief examiners' results, as indicated in the above table. This may be done in several ways: (1) By a closer study of the figures in the above analysis. 50·9 per cent. of the assistant's scripts have under 50 per cent. of the marks (add the first five columns) as against 49·9 per cent. of the chief examiner's. 10·4 per cent of the assistant's scripts have 70 per cent and upward of the marks (add the last four columns) as against 12·3 per cent of the chief examiner's. Sometimes an assistant will have an unduly large number of his scripts marked between 40 and 59: in this case only 44·6 per cent. as against 41·1 per cent, but often, say, 49·5 per cent. as against 41·1 per cent —a result typical of an assistant still weak in the power of discrimination, tending to give too few very high or very low marks (or, as we say, "bunching" his marks), a personal idiosyncrasy of some examiners to be coped with by a well-devised and detailed marking-scheme.

(2) By the use of distribution graphs made for each assistant, with the central distribution graph sketched in beside it for purposes of comparison. Discrepancies reveal danger-points to experienced eyes.

The first graph reveals a case of serious under-marking, while the second looks like a case of over-marking unless the sample marked has been predominantly from districts with an unusual number of able candidates.

(3) By the drawing and comparison of percentile curves. For this more technical method see Appendix, p. 154.

STANDARDIZED MARKING

After this preliminary investigation of each examiner's results, the person responsible for the statistical work of the whole examination hands the assistant's scripts together with his mark analysis and curves to the chief examiner concerned, with a request for at least a random scrutiny of his work, and in cases of uneasiness a special scrutiny of the scripts involved in the

——— Assistant Examiners Distribution
----- Chief Examiners Distribution
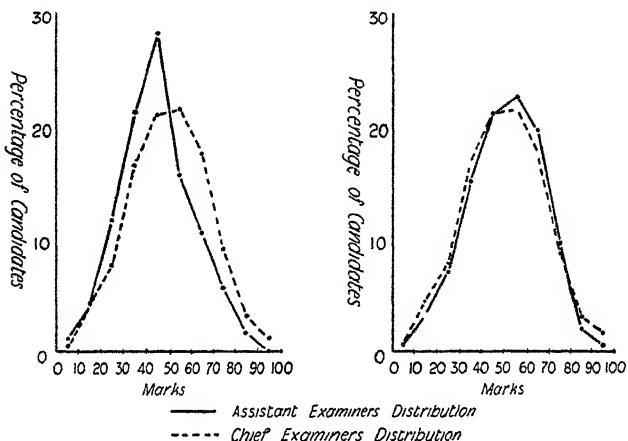
ranges of marks giving results widely different from the central standard. Again different methods are adopted by different authorities, but the aim of all is, first, to discover any significant discrepancies in marking standards and by one method or another to reduce them (by, for instance, raising or lowering the standard of all, or by re-marking the relevant scripts) ; and, second, and usually later, to study with particular care the marking of the scripts of those who are true border-line cases—those nearly winning or nearly losing scholar-

ships, those nearly passing or nearly failing in a quali-
fying examination, those nearly obtaining "credits" or
nearly missing them in a School Certificate examina-
tion In the following pages we shall outline a method
used for dealing with about six thousand scripts marked
by about twelve assistants in the light of about one
thousand scripts marked by a chief examiner, in an
examination where the time presses (the office staff
urgently requiring the assistants' approved mark-
schedules so that they may adjust[1] the marks and
enter them in the registers), and where a fair amount
of the competitive element enters because the number
of scholarships or "special places" has previously been
approximately fixed by the authority. In all there are
four sets of about six thousand scripts to standardize,
the 10-year-old English and arithmetic, and 11-year-
old English and arithmetic.

Two stages in the work of revision are clearly marked,
to correspond with the two stages noted above: (1) a
general approximate harmonizing of standards, and
(2) as accurate as possible a placing of the border-line
candidates' scripts. In earlier days the attempt was
made to re-mark all scripts showing discrepancy. This
proved an overwhelming and unnecessary task. Now
in stage (1) we merely attempt to reduce all variations
in marking standards to a limit of not more than 4 per
cent. up or down. It is recognized that this amount of
variation may be due to an examiner's "personal
equation," for instance, in judging style in both English
and arithmetic, or to an error in marking some one
small detail of a paper, or to a vague unsteadiness.
Once it is certain that an examiner's variation does not

[1] See pp 83–84, 147.

exceed 4 per cent. up or down from the central standard, his work passes the first scrutiny Once it is certain that even occasionally his variation exceeds this 4 per cent., his work is at this stage re-marked in pencil of a special colour (say, red), but *only to the extent necessary to bring his variation within the 4 per cent limits.* For instance, an examiner in arithmetic marks two points wrongly when these occur in a script. In one case he gives 3 marks too few, in the other case 4 marks too few. It is seldom that both points occur together, but they do sometimes so occur. Now it is not necessary to alter the marks of *both* questions if the rest of the paper is accurately marked or a little overmarked, but if the rest of the paper is undermarked, even to a small extent, the marking of both these points must be checked up. If the rest of the marking is accurate or too lenient, it is only necessary to mark one of the points · the chief examiner for greater safety chooses the question in which the deficit of four marks may occur, using the mark-schedules to find the scripts in which the marking may have erred in this respect: for instance, it is unnecessary to re-mark the scripts of candidates who have either not attempted the problem in question, or have secured full or nearly full marks on it A similar procedure is adopted in English as between composition and comprehension questions, or among the various details of marking the composition . for instance, at this stage it may be necessary to re-mark a particular examiner's compositions for "ideas" only. Thus each chief examiner first makes a random scrutiny of the scripts marked by Mr X, noting at the same time Mr X's curves and mark-analysis, and paying special attention to any particular range of marks where the

comparison of curves shows marked variation from the central standard.

A considerable amount of time is spent in this thorough random scrutiny of Mr X's marking. At the best it takes an hour of rapid concentrated work. Typical points which may arise are as follows: It is obvious that Mr X overmarks compositions. All composition subjects, or only one? By how much? Usually two marks? Sometimes 3 or 4 marks? Ever more than 4? More than 4 generally, or only in high grades or medium grades or low grades of compositions? Other questions accurately marked? Detailed marks added correctly? . On and on this goes until the chief examiner concerned is ready to make a definite report to the person in charge of the statistical work. This report may be "Very good marking throughout," and Mr X's mark-schedules are forthwith passed on to the clerical staff for adjustment and entry into the registers against the names of the candidates. It is usual for only the clerical staff to have access to the candidates' names: the script of each is identified by a number only. The report may be, "A certain amount of over-marking (or under-marking), but never by more than 4 per cent."; these too are passed, and the scripts move on. Examples of less satisfactory reports are: "Composition subject B is always overmarked and should be re-marked in the relevant ranges," or "Three of the problems are undermarked, but particularly Question 6. Questions 6 and 7 should be re-marked in the relevant ranges." The important point is that the chief examiners make a *definite* report with a view to reducing the particular assistant's variations to within the 4-per-cent. limits.

STANDARDIZED MARKING

The statistician has now to decide what ranges of marks are relevant in the revision of any particular examiner's work—a technical matter which is one of the most difficult points in standardization The range for overmarking is usually a little different from that for undermarking. The ranges must be so chosen that no candidate shall secure an unchecked award because his paper has been overmarked, and no candidate shall be omitted from the border-line revision because his papers have been undermarked. When the chief examiner again receives an examiner's papers from the statistician, he begins a careful scrutiny of the questions he had previously selected as requiring revision in all the scripts lying within the ranges indicated as relevant. All necessary alterations are duly entered in the mark-schedules in a distinctive colour (red is suitable when blue has been used for original marking), fresh analyses of marks are made, and the curves altered accordingly. The result of this partial re-marking is always an improvement in the curves in the relevant ranges, although they may show queer absurdities above or below them. The aim, however, is not to secure correct final curves, but to use the curves as (a) an indication of the amount of re-marking necessary, and (b) a check on the adequacy of that re-marking

Over several years of experience it has been found that about one-third of the assistant examiners return work which requires no re-marking at all in this first stage. About one half of the examiners require the re marking of one or two definite points involving several hours of work from the chief examiner, but comparatively quickly the mark-schedules of all of these pass on to the clerical staff. There is a small residuum

of assistants whose work requires general re-marking and of whose scripts probably one-half to two-thirds have to be examined one at a time. This large amount of re-marking is compensated for by the conviction that without it serious injustice might be done to some candidates. Most of the examiners whose work requires so much revision ought not to be invited to serve again, but exceptional circumstances occur, and an examiner marking for the first time should in general be given a second chance. The rather slow progress made in re-marking the work of the less competent examiners does not retard the work as a whole, as the clerical staff have all the others' marks to adjust and enter, and have also to select the scripts for "border-line revision." This selection cannot be made until all the factors relevant to awards have been considered—age and other allowances (such as an allowance for candidates entered from "schools of special difficulty"), totals for English and arithmetic, and any other score such as an intelligence-test rating.

(2) The second stage of re-marking—border-line revision—cannot be hurried. It is best carried out on scripts and mark-schedules in a different colour from that of either the original marking and entering or the first re-marking; green is suitable. The scripts of all candidates whose marks bring them within 5 per cent. (compare the 4-per-cent. limit of the first re-marking) of the top or bottom of a large border-line list from which the last awards will be made, are re-marked thoroughly to the central standard by the chief examiners, who by now can bring to bear on this re-marking of a final, say, two thousand scripts out of an original entry of fourteen thousand candidates, all the

76

experience which they have garnered in their own preliminary marking and in all their revision work. Needless to say the chief examiners' own first marking is at this time revised along with everybody else's. Now also is the time for clerical revision of the scoring of these candidates' intelligence tests and for any revision of the age-allowance bonus necessitated by the actual results of the current examination (see pp. 88–95).

When the results of this border-line revision have reached the registers, the awards list can at last be completed in the knowledge that something resembling rough justice has been meted out to the candidates in the matter of harmonizing the work of the large team of examiners required to deal with a large entry of candidates

Those who advocate the abolition of English compositions and arithmetical problems, and who would rely on short-answer tests alone, give as one of their main arguments that they would thus do away with all the strenuous effort described above. It has, however, been found necessary to check the marking of assistants, not only in essays and problems, but also with regard to their steadiness in dealing with answers the marking of which had been considered foolproof. Within one large office, where the clerks are responsible for marking an intelligence test from keys supplied by the authors of the test, it has been found necessary not only to check separately in pencil of a different colour the marking of every candidate's paper, but also to give a third and final check to the marking of the papers of border-line candidates (say, one thousand in ten thousand). The marking even of foolproof answers requires care, and too great speed, fatigue, or any other physical or mental trouble always impairs its accuracy.

VII

THE BIRTHDAY PROBLEM

AT an early stage in the extension of Secondary education to those unable to pay Secondary-school fees, some enlightened authorities bethought themselves of arguments (to which reference has already been made on p. 14), which tend to show that children's chances depend to some extent on whether they are born in a lucky or unlucky month. They realized that of a group of children taking the same papers on a given date, those who were as young on that date as the examination regulations allowed them to be had a much poorer chance of success than those who were as old on that date as the regulations allowed them to be. ' These enlightened authorities accordingly gave a bonus of marks to the younger candidates in an age group, with a view to equalizing the chances of success of all the children taking the examination. Their problem was how to reckon the size of the bonus. There are still some authorities—now rapidly decreasing in number—who give no bonus to younger candidates. the problem facing them is the problem which faced the more go-ahead authorities a good many years ago.

Perhaps, however, it is as well, before passing on, to ¬indicate a simple method by which such authorities can be convinced of the necessity for any change. The successful candidates in one or more of their recent examinations must be sorted out into their different birthday months, so that, for instance, of a group of awards

given to children aged 11–12 years, those for 11 years
0 months, 11 years 1 month, 11 years 2 months, 11
years 3 months, etc., may be counted separately. For
the reasons already indicated on p. 15, it is obvious
that the more awards there are the clearer will the
result be, but even with 100 awards the inequality is
likely to be made very clear. For general purposes,
every authority ought to make public for each examina-
tion the number of awards going to the pupils born in
each quarter of a year, in some such form as this:

Age	$11-11\frac{1}{4}$	$11\frac{1}{4}-11\frac{1}{2}$	$11\frac{1}{2}-11\frac{3}{4}$	$11\frac{3}{4}-12$	Total
No of awards	14	21	29	36	100

If, as in the above case, 35 scholarships out of 100 go to
children with birthdays from February to May and
65 to children with birthdays from August to January
(ages being reckoned as from 1st August), some altera-
tion in the conduct of the examination is badly needed.

In its simplest form, the above table is the test which
every device for calculating age-allowance bonuses
must pass. It is therefore of importance to place it in
the forefront of this chapter. It is a table which checks
complicated mathematical calculations but is easily
compiled by any ordinary clerk. Wherever possible,
however, its form should be strengthened in two ways.
A return should be obtained from the Junior schools and
departments of the area involved showing the number
of children in each aged 11 years 0 months, 11 years
1 month, 11 years 2 months, etc., on the date fixed by
the authority. From these returns it is an easy matter
to find the total number of children in the population

aged $11-11\frac{1}{4}$, $11\frac{1}{4}-11\frac{1}{2}$, $11\frac{1}{2}-11\frac{3}{4}$, $11\frac{3}{4}-12$. Extra-ordinary circumstances, such as in recent years the peak of post-war births, may cause some inequality in this quarter-to-quarter child-population of the district. What ensures fair play is that the distribution of the scholarships to the four quarters of the year shall correspond closely with the distribution of births to the four quarters of the year. This, for instance, is a satisfactory table, just as the one above was an unsatisfactory one:

Age	$11-11\frac{1}{4}$	$11\frac{1}{4}-11\frac{1}{2}$	$11\frac{1}{2}-11\frac{3}{4}$	$11\frac{3}{4}-12$	Totals
No of awards	29	32	34	30	125
Nos in schools	564	603	612	604	2383
Awards as per-centages of scholars	51%	53%	56%	50%	52%

Annual tables of this form should be regarded as the minimum amount of information to which the general public is entitled on this question of fairness with regard to birthday months

We return to the problem facing these early en-lightened authorities. how many marks are we to give as a bonus to younger candidates? First thoughts in most cases evolved the plan of giving the child one month below the oldest possible candidate 1 per cent. of his marks as a bonus, the child two months below 2 per cent. of his marks ... the youngest child (11 months below) 11 per cent. of his own marks: these first thoughts are still the only thoughts of some authori-ties. In 1928 the Board of Education published a

80

booklet dealing with examinations for free places in Secondary schools. In this they stated that the majority of those local Education authorities who apply an age correction give an allowance depending not at all on the child's own marks, but only on his age   This report, together with various pieces of research since reported on by different authorities or published in the *British Journal of Educational Psychology* or other less technical educational journals, have made it very clear that to calculate age allowance on the basis of the candidate's own marks works out unfairly. These bonuses are given, not because A is cleverer than B, but simply because A is younger than B. If A is young, he is likely to·get lower marks than an equally able child who is older. If his bonus is low because his marks are low, we are giving with one hand and taking away with the other. Take, for instance, a group of 11–12-year-olds working an arithmetic paper, and allowed a bonus of 1 per cent. of their own marks per month of youthfulness. A child of 11 years 8 months old secures, say, 69 marks; his young friend, 11 years 0 months old secures 56 marks. The older child, with 3 months of youthfulness, is allowed 3 per cent. of 69 marks, while the younger child, with 11 months of youthfulness, is allowed 11 per cent. of 56 marks: this gives the older child a bonus of 2 marks and the younger by eight months a bonus of 6 marks, a difference between them of 4 marks. Does this difference of 4 marks represent fair treatment to the young child as compared with his friend 8 months older? If, however, the bonus is, as it were, a free gift of 1 per cent of the maximum marks (in this case 100 marks), the older child receives 3 marks, the younger child 11 marks: the difference of 8 marks is

somewhat nearer justice It is interesting to note that the Board of Education, speaking in 1928 out of their experience gained from a thorough investigation of the examinations of a good many authorities, gave it as their opinion that this free bonus never works out fairly if it is less than 1 per cent of the total marks (as calculated above), and that it sometimes ought to be as much as 2 per cent They pointed out that the only way to decide how much the free bonus should be was to consider the actual successes of candidates born in the various months of the year If the younger candidates were too successful as compared with the older, the bonus was too high if the older candidates were too successful as compared with the younger, the bonus was too low.

From several years of personal experience of a large examination awarding well over two thousand scholarships to a field of over twenty thousand school children in a one-year age group, where for each year the successes in each quarter of the year are measured against the births for that quarter, we have found that for combined English and arithmetic marks, an age allowance of about 1·2 per cent. of the maximum marks per month of youthfulness gives a fairly even distribution of awards to the four quarters of the year. When more time was allowed for the papers, 1 per cent. was found to be nearly enough: when the time for English and Arithmetic was considerably reduced owing to the introduction of an intelligence test, 1¼ per cent. was found to be just a little too kind to the youngest candidates. 1·2 per cent. per month has recently worked out not too badly, but if the type of papers set were in any way altered or the time allowed for them altered,

82

a slightly different allowance would have to be made on the best knowledge at one's disposal. This method obviously gives no more than rough justice, since the age-allowance bonus is settled in advance, and the results of the checking, although worked out for every year's examination, can be acted upon only in the subsequent year. Moreover, results for the four quarters of the year, though apparently satisfactory, may conceal severity to the youngest month and too great leniency to the oldest month of all.

Research into these problems leads us to believe that if English and arithmetic marks are dealt with separately, the age allowance for English should be less than that for arithmetic Common sense corroborates this, since English marks always tend to come closer together than arithmetic marks on an order-of-merit list, neither the very high nor the very low marks to be found in an arithmetic list being common in an English one. It also strikes the ordinary observer that success in arithmetic is apt to depend, more than success in English, on the amount of ground covered in class : hence any handicap in time for learning affects arithmetic more than English If, however, in arithmetic, papers are set which are searching tests on an elementary syllabus rather than less searching tests on a more advanced syllabus, younger children are less seriously handicapped. This agrees with the point noted on p. 11 in connexion with levelling up the chances of the undertaught children.

It may be noted here that before English and arithmetic marks are combined in whatever ratio is decided, an adjustment can be made (by means of percentile curves or otherwise: see p. 147) so that the top

candidate on each list has the same mark, the tenth candidate from the top on each list the same mark, the fiftieth candidate from the top on each the same mark, and so on right down the lists. English marks and arithmetic marks are then spread to the same extent, and the candidate good in English has an equal chance of securing a high total with the candidate good in arithmetic.

In this discussion we have confined ourselves to the problem of securing justice for a group of candidates aged 10–11 years, *or* $10\frac{1}{2}$–$11\frac{1}{2}$, *or* 11–12 on a certain date, each group being tested by its own set of papers. Local authorities in this country vary a good deal as to the age at which they desire able children to enter Secondary schools. If Secondary-school places are few, they will postpone entrance. If form-rooms in Secondary schools are not full, they will take children at an earlier age. The Secondary schools themselves vary considerably as to the age at which they desire to take "special place" scholars: some like to have all as young as possible, others only the exceptionally able. In some districts the Heads of Primary schools are unwilling to lose their ablest children at an early age, even if they are allowed to include past pupils passing to Secondary schools as part of their numbers for the purpose of grading for salary. They feel that the whole school suffers by the early withdrawal of these pupils. On these varying opinions depends in any area its customary practice with regard to entrants of different ages. In districts where reorganization has already taken place, and ample provision is made for the various types of post-primary education, it seems highly desirable that the normal age for consideration should

84

be 11–12 on September 1. This means that each child is transferred to a school for further education at the age of 11.

Even so, special problems will arise. After the correct age-allowance bonus has been given for the birthday months within the year group, what is to be done with children who miss the tests because of illness or other special circumstances, or who have missed as much as six months' schooling at a time immediately before the examination, and who, in consequence, ought to sit a year later? And what is to be done with the few brilliant younger children who are fully ready for Secondary-school work at a comparatively early age, and who cannot afford to waste time on what is to them too easy work in view of their need of securing valuable scholarships at the age of 17 or 18 to permit them to proceed to a University? With the older children, the extended but perhaps modified use of the age allowance as a deduction instead of a bonus is the general practice, with personal investigation of all the circumstances involved. These cases are true exceptions. In the case of young children, most authorities confine their tests to one complete age group, but permit these younger children to take the same papers, allowing them either only the maximum age-allowance bonus for the year group, or allowing them only the ordinary bonus corresponding to their birthday month even if they are one, and, in rare cases, two years younger than the other candidates born in the same month. These policies, of which the second is the more severe, ensure that only the exceptionally able young child, almost certain to proceed later to a University, will enter the Secondary school before 11. Authorities adopting these

methods vary them from time to time and seldom, to judge from their reports, seem entirely satisfied as to the best method of providing an early door for brilliant children. Some state frankly that research into this problem is required before wise decisions can be made.

If an authority wishes for a substantial entry of 10-year-olds into the Secondary schools, as well as a good entry of 11-year-olds, neither of the above methods will achieve it If equally large entries were desired, the age for which the papers should actually be set would be 11 years 0 months on a fixed date. All above that age should suffer a deduction of marks reckoned as a certain percentage of the maximum per month of age: all below that age should have a bonus added to their marks, reckoned in a similar way. Moreover by this means all children may have two attempts at the examination: a genuine second chance is given. An alternative method is to set two papers, one for 10–11, one for 11–12. Technically this is an easier matter than setting one paper suited to a complete age group differing by two years, for at this period of their lives a year makes much difference to a child. If either of these methods is used, the older group when examined has already lost its best members to the Secondary schools: in other words, it has been "creamed." A little cream is in any case removed by either of the methods of the preceding paragraph, but here the cream must in general be regarded as having moved to education in a Secondary school at its first opportunity. Even where authorities provide for a general entry of 10-year-olds, it is noteworthy that it is extremely difficult to ensure the presentation of the youngest of these candidates unless *all* the 10-year-olds in the area are in some way tested.

86

THE BIRTHDAY PROBLEM

This indicates another aspect of the problem of unlucky birthday months In every case where children are entered for scholarship examinations at the discretion of the Primary school as "recommended" candidates, whether with or without the safeguard of permitting parents to enter any non-recommended child at their own special request, there is a tendency for those born in the earlier months (the older children) to be presented in greater numbers than those born in the later months (the younger children). The discrepancy is more serious in the case of the 10-year-old entrants than in the case of the 11-year-old entrants Some suggest that this is partly due to the later age at which children in some districts now pass from Infant schools to Junior schools, as it leaves "too little time to cover the ground."[1] But the children are not younger than they used to be Others suggest that the harassed teachers of very large classes are not always completely aware how far Tom lags behind Harry because of innate weakness and how far because of greater youthfulness. The laggards are, naturally, not entered to the same extent unless the school has means—such as age allowances in internal tests or the use of a group intelligence test with intelligence quotients—for checking up the school estimate as to who really are the promising children to be passed on to the external tests. Until the Primary schools themselves overcome this problem of uneven entry, it is impossible for any external test, however sound and generous its age-allowance bonuses, to do justice to the younger children of an age group. In fact, it is only if the less advanced younger children are entered that a sufficiently large bonus is likely to be

[1] See pp 127–129

given. When post-primary education has been re-organized and the *whole* field of, say, $10\frac{1}{2}$–$11\frac{1}{2}$-year-olds is examined with a view to deciding to which type of school they should be transferred, then this injustice to children born in certain months of the year will become a thing of the past.

For, of itself, the taking of any test by a complete age group of any considerable size (500 at least, and better 1000) allows of what is by far the most satisfactory way of computing the correct bonus to be given for youthfulness This, it may be said, is the result of the latest research into the whole problem, and all concerned, including the present writers, owe a great debt to Professor Godfrey Thomson for his inspiration and constructive criticism. Methods devised by him for dealing with age differences in group intelligence tests are now being tested in a variety of directions. For full information we refer to Professor Thomson's articles in the *British Journal of Educational Psychology* (Volume II, 1932, Parts 2 and 3) on " The Standardization of Group Tests," and in a less complex form to an article by J. W. Collier on The Northumberland Grading Examination, which appeared in the Supplement to *The Schoolmaster* of May 31, 1934. Here the matter is dealt with on broad, non-technical lines.

The best method is obviously not to make shots in the dark at the correct bonus for any examination, check the results of its use, as suggested on pp. 80–83, and then apply this knowledge to the subsequent examination, but in any test to find out what actually has been done by children of 11 years 0 months, 11 years 1 month, 11 years 2 months . . . 11 years 11 months, and compare the results of the April children

88

with those of the May children, June children, and so on. In actual fact the results differ from month to month: we have to find out how to equalize the results. Mathematically, the matter is not quite simple, although it can be done quickly by being reduced to a rule-of-thumb method, and is possible of computation by a good clerk, even if he has not specialized in mathematics As an illustration, we give the following table, showing the results of some 2,500 10-year-old candidates in one examination in English and arithmetic, the April candidates being the oldest (10 years 11 months) and the March candidates the youngest (10 years 0 months).

NUMBER OF CANDIDATES GAINING CERTAIN MARKS IN
EACH BIRTH MONTH

MARKS	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
0–9	1	2	3	0	0	1	1	0	3	0	2	3
10–19	5	5	10	8	8	8	7	8	4	11	11	10
20–29	13	19	26	24	23	16	33	21	17	22	16	23
30–39	38	42	35	40	44	35	44	38	36	41	34	44
40–49	45	60	58	59	59	55	71	41	57	37	36	31
50–59	75	61	48	55	57	51	43	29	37	29	21	27
60–69	47	47	28	36	34	23	25	17	20	11	15	20
70–79	24	20	21	18	11	17	8	4	6	7	7	8
80–89	9	6	2	2	6	2	3	2	1	1	0	1
90–99	1	1	3	2	0	1	0	0	0	0	0	0
Totals	258	263	234	244	242	209	235	160	181	15	142	167

After such a table has been made, each month's results can then be considered separately. By mathematical methods (see Appendix, p. 151) we can find for the April children the mark gained by a candidate $\frac{1}{4}$ of the way down the order-of-merit list for that month, by a

candidate $\frac{1}{5}$ of the way down, $\frac{1}{6}$ of the way down, $\frac{1}{8}$ of the way down, $\frac{1}{14}$ of the way down. Candidates farther down the list matter little in an examination selecting only the most able children, and, as the examination of which results are given in the above table suffered from too small an entry in the youngest months, the readings towards the bottom of the list are quite unreliable. Alongside these readings for April children we put the results for May children, June, July . March children

The following are marks for English and Arithmetic, expressed as a percentage, for candidates $\frac{1}{5}$ of the way down another list, where uneven monthly entries had been technically "smoothed out."

APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
69	67	64	64	63	61	59	54	56	52	52	56

The marks steadily fall with the birth month, except for a chance inequality in November–December marks, and the rise in the earliest month, which latter is probably due to the fact that the less able children of that month have been excluded. By other mathematical methods, the unevenness of this list is smoothed out, and the calculated result is that children $\frac{1}{5}$ of the way down the list (the 20th child in a list of 100, or about the 1200th child in a list of 6000) require a bonus of 1·3 per cent. of the maximum marks per month of youthfulness. When a table was made of the marks obtained by candidates only about $\frac{1}{14}$ of the way down the same list (7th in a list of 100, about 430th in a list of 6000), it was as follows.

90

APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
78	76	75	73	74	72	69	65	66	64	65	67

Here the steady fall in marks is broken by slight unevenness in July–August, November–December, January–February   One notes again the rise in March due to too few of the youngest less able candidates being presented   The mathematical result, worked out as above, gives a calculated monthly bonus of 1·2 per cent of the maximum marks. When a table was made of the marks obtained by candidates $\frac{1}{4}$ of the way down the list (25th in a list of 100, about 1500th in a list of 6000), it was as follows.

APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
68	65	61	62	60	58	56	50	53	49	48	52

Here the fall in marks is broken by unevenness for June–July, for November–December, and again by a definite rise for March. The calculated result is that candidates about $\frac{1}{4}$ of the way down the order-of-merit list require a monthly bonus of 1 5 per cent of the maximum marks.

At first sight this seems an amazing result · the farther down the list a child is, the greater should his age-allowance bonus be : the youngest, requiring an 11-months bonus, needs 1·2 × 11 a short distance down the list, 1·3 × 11 rather farther down the list, and 1·5 × 11 when about one-quarter of the way down the list. In other words, 13, 14, and 16½ marks are the maximum bonuses in different positions on the order-of-merit list   What a difference from the original first thoughts about these bonuses, that they should depend on the marks gained by the candidate,

so that the farther down the list one went, the smaller the bonus that was awarded ! There is one flaw in this piece of personal experience of the actual difference in marks due to difference in age, and that is the poor entry in the youngest months. This makes the calculated results increasingly unsound as one goes farther and farther down the list, for the work has necessitated the assumption that all the very ablest young children were entered Fortunately this personal experience has only been used for the sake of providing a definite illustration What has been published elsewhere corroborates these results The Bradford authority has investigated the comparative performances of children who take the same examination in two successive years, after first standardizing the difficulty of the one examination by the other. By comparing the candidate's place on the order-of-merit list with his increase in marks due to a year's progress, they found that they could afford to give candidates farther down the list a larger age allowance than those near the top of the list. Professor Thomson has found the same to be true in his investigations on the Moray House Tests, and the Northumberland authority has found it to be true of their standardized English and arithmetic tests given to *all* children of one age group. We quote from the Supplement to *The Schoolmaster* (May 31, 1934) the Northumberland English result in one set of tests:

PLACE IN LIST APPROXIMATELY	AGE BONUS PER MONTH	YOUNGEST CHILD'S BONUS
$\frac{1}{10}$ way down	93 marks	10 marks
$\frac{1}{4}$ way down	1 05 marks	12 marks
$\frac{1}{2}$ way down	1 5 marks	$16\frac{1}{2}$ marks
$\frac{5}{8}$ way down	1 06 marks	12 marks
$\frac{19}{20}$ way down	63 marks	8 marks

Here the actual work done by children born in different months shows that the bonus should increase until one is half-way down the list, and then decrease again towards the bottom of the list.

What is the reason for these extraordinary results? Is it true that abler children develop more slowly than the more mediocre children? That cannot be believed. The truth is that these figures deal, not with the growth in a child of knowledge and intelligence, which is a vital matter following its own growth law, but with marks gained in tests of various kinds, the best of which are but artificial methods of measuring knowledge or intelligence. These results are true for the particular test to which they refer, but while to allow a bonus for youthfulness is to meet a biological requirement, to vary that bonus a little according to the candidate's place on the list is to meet the fluctuating situation created by the very artificiality of the method of measuring attainments and capacity by tests. Once we have grasped the idea of the examination as an artificial device for measurement, we can easily see why the above results work out as they do. In most examinations devised so as to spread the candidates widely over the marks, a few searching questions prevent all but the most brilliant from securing the highest marks. It is much harder to rise from 70 to 75 marks than from 50 to 55, but harder still to rise from 90 to 95. Thus for candidates at the top, the variation in marks per month of age is less than for candidates towards the middle of the list. Again, if the examination is devised so as to set nervous candidates at their ease, a certain amount of very easy work is certain to be included. This means that comparatively few candidates get less than 20 per

cent and still fewer less than 10 per cent. In other words, it is harder to drop from 25 to 15 than from 55 to 45, and harder still to drop from 15 to 5. Hence the drop in the age-allowance bonus towards the bottom of an order-of-merit list

What is the practical bearing of this latest research into the correct bonus to give to younger candidates? The Moray House Tests are using a system of standard scores, and the Northumberland Tests a system of scale values, into which points or marks actually scored are transferred by a different scale for each month of birth   The reader is referred to the articles mentioned above.   For those who examine only the abler part of a very large age group, the empirical method recommended in the Board of Education's 1928 booklet and described here on pp 80–83, may be used for obtaining a first approximation to the correct order-of-merit list   One's confidence in this method is increased by finding that the bonus reached by empirical methods corresponds with the bonus as calculated to be right for the middle part of the list of successful candidates. The ablest children will in any case secure their awards, and the weaker children will in any case be out of the running.   The remainder is the true border-line, and nearly every authority dealing with large numbers now applies some extra test at this stage to discriminate between candidates varying by very little.   Within this true border-line (perhaps one thousand out of ten thousand candidates) would appear to be the place to use this newer method in order to find the correct sliding scale of bonuses for the various positions on the list.   In the critical part of the order-of-merit list, where awards are only just made or just not made, for the

youngest child a difference of from 1 to 4 marks may, in general, be expected, but exactly what the difference will be depends strictly on the particular nature of the test or examination   To omit this final step is obviously a very small matter, when compared with the errors made by giving no age allowance at all, or using one which does not result in a satisfactory table of the type illustrated on p. 80.

In the Appendix on p. 149 will be found a simple mathematical account of a method found practicable in dealing with large numbers and a somewhat uneven entry. This may be useful to those responsible for examination statistics in cases where either the large number of candidates or the uneven entry or a combination of these difficulties makes standard-score or scale-value methods difficult to use [1]

[1] See also *British Journal of Educational Psychology*, June, 1936.

VIII

THE PROBLEM OF HUMAN TYPES

AMONG the causes militating against the examiners' attempts to give every child an equally good chance in those tests which determine the nature of his post-primary education, we mentioned the difficulty of dealing fairly by girls as well as boys, by those predominantly ear-minded as well as by those predominantly eye-minded, by those of slow development in muscular co-ordination as well as by those of quick development. These were obvious illustrations chosen to indicate one set of difficulties facing those responsible for our educational system—those arising from the fact that human types are so numerous and so widely variant from one another. The sum of knowledge on these matters has in recent years increased by leaps and bounds.

Almost all teachers, together with some parents, have nowadays a working knowledge of the general psychology of the individual, enough to give them some guidance in their contact with children. We know that children vary in the strength of their instincts and emotions; that, where one is timid, another may be pugnacious; where one is happy in obedience, another loves to rule; where one may show keen interest in making collections of various kinds of inanimate objects, another is extremely dependent on the society of his fellows. We now know more than merely that children are born with good or bad memories. Some learn

96

slowly, but retain well what they learn; others learn quickly and still retain well; while others, both slow and quick learners, have memories not at all retentive. Some learn best by looking at what they have to learn, some by having it read to them, others by writing it out, yet others by saying it aloud or "under their breath." Some children have a far better memory for figures than for words. We know that some can grasp facts and reason well from them, but yet are weak in power of imagination. Of those with strong imagination, some are capable only of rather fantastic and unreal day-dreams and imaginings, while others with the gift of a constructive imagination represent the class of future inventors or original thinkers. These things are familiar to most of us, although we do not always remember them in revising the drafts of examination tests.

Modern knowledge of the variety of human types, however, extends far beyond such elementary psychological facts as are here used for illustrations. This growth of knowledge was perhaps brought about by the technique and practice of psycho-analysis, together with the great development of psychotherapy which accompanied and followed the Great War, when men passionately desired to heal the minds as well as the bodies that had been broken by that catastrophe. We have also the contributions of such educational psychologists as Professor Cyril Burt and Dr C. W. Kimmins, who have made investigations into special problems such as those connected with young delinquents or backward children, or with the nature and causes of children's dreams. The farther the pioneers have advanced the more they have found yet to learn. In one issue of

an international journal,[1] published to form a meeting-place for those who study the problems of character and personality all over the world, there is an article on what the writer calls "Personalysis" This offers for constructive criticism a method of presenting the outlines of any person: the idea is that a few of a man's friends might fill in a form given in detail, and a summary be made from their views of him combined with the findings of the investigator. This form demands ratings on such familiar aspects of any human being as his facial appearance, his voice, his intelligence, his sense of humour; but in all it contains twenty-seven columns for separate ratings, with corresponding spaces below each in which to note any special observable defects, anomalies, and idiosyncrasies. It is significant that the last column is reserved for some measure of the extent to which the man is one man, of single mind, or, to put it technically, to what extent his personality is integrated: in other words, there is frank recognition that the man is more than the sum of his qualities of every conceivable kind, that the pattern which he makes out of his qualities has vital meaning. It is very easy to laugh at this sort of thing, but such well-known men as Dr William Brown and Dr William McDougall are two more of the four main contributors to that number of the journal, while the last of the main contributions comes from a colleague of McDougall. Found in such sound company, the writer of "Personalysis" must be taken seriously. Another most modern development is the scientific study of handwriting or graphology, as it is called—a matter as far removed from the old ideas about reading character from hand-

[1] *Character and Personality*, January, 1935, A. A. Roback.

98

writing as astronomy from astrology   One clear result obtained is that the handwriting, even of children, is an expression of personality. The handwritings of twins have been proved by scientific measurement to resemble each other much more closely than the handwritings of ordinary brothers and sisters; the handwritings of identical (monozygotic) twins to resemble each other more closely than the handwritings of fraternal (dizygotic) twins; the handwritings of brothers and sisters more closely than the handwritings of unrelated individuals. It is true that handwriting can be taught, but only to a limited extent. Handwriting is far more than an expression of what has been taught

At first sight these modern developments may appear to have little to do with the subject of examinations, but the nature of the candidate to be examined is surely of vital import to the nature of the examination.   If human nature is so complex, its types so many, and the springs of its working so deeply hidden, examination tests and the marking of them can never be completely simplified. We may avoid too much writing by candidates (to avoid penalizing the able child with late development of his powers of muscular control) by providing some parts of the tests where answers can be given in a single word or number, or by making a single cross or underlining; or we may print some of the arithmetic questions on the answer paper ready for working· but we cannot hope to reduce every part of our tests to this degree of simplification. Some writing of words in English and some writing of figures with words in arithmetic are of value as fuller expressions of the self even of the young candidate. Power to write some connected sentences, however simply, on a subject

treated as a *whole*, power to analyse a situation presented as a *whole* in a topical arithmetical problem and apply to it the required calculations, correspond with the demand of life for strong, well-knit human characters, or personalities showing a high degree of integration · correspond also with the whole trend of the "gestalt" school of psychology. From this most modern standpoint, moreover, one again reaches the necessity for multiplying the lines of evidence on which a child's future career is settled

Very little has been done as yet in investigating how various types of candidates respond to the various parts of examination tests: all that has been done in most cases is to study the differences between the responses of boys and girls. It is known that boys differ far less from girls of the same type than from boys of different types. In setting essay subjects and in choosing the material for arithmetical problems and for comprehension tests, it is common to try to reach the vital interests of children of the age in question, and to give a choice which will allow scope for different types. We have imaginative and factual essays, problems expressed in diagrams as well as those expressed in words, everyday and adventurous material, questions making a definite call on memory, questions in which good memory is a help, and those in which clear thinking may triumph over a poor of temporarily erratic memory. The way in which marks are allotted to the different parts of a test and to the variety of answers possible within some of its questions also expresses something of the examiners' concern for the different human types undergoing the test.

Another ten years of research into human physiology

and into psychological tests other than pure intelligence tests would appear likely to make a vital alteration to the terms of our problem. The selection of candidates for the American army during the Great War afforded the first great practical opportunity of using intelligence tests: the aftermath of that war has led to an increasing development of tests which are more than intelligence tests

We here present some results of investigations into the differences between boys' and girls' work in recent examinations in the West Riding of Yorkshire. In these examinations an attempt was made to give equal justice to boys and girls as against each other, and some of the results may be suggestive. The possibility of improving girls' arithmetic and boys' English must also be kept in mind. The figures may be taken as fairly reliable, since the samples on which they are based consist of from 500 to 1000 scripts chosen to be representative of various types of schools and districts over a wide area, and marked by the chief examiners. In many cases the results so obtained have been corroborated by the reports of assistant examiners who mark about 500 scripts each.

In general, girls do a little better than boys in English, boys distinctly better than girls in arithmetic. In recent examinations such arithmetic figures as these are representative: 46 per cent. of the boys as against 39 per cent. of the girls obtained half marks or over. In English the difference between the work of the boys and that of the girls is not so marked, because while girls generally do better than boys in essay writing, especially in the mechanics of composition, boys do better in comprehension tests. In a recent examination

SELECTION OF CHILDREN

46·3 per cent. of the boys and 47·2 per cent. of the girls obtained half marks or over in English.

In English composition some subjects appeal (*a*) more to boys; (*b*) more to girls; (*c*) about equally to both sexes. In the following tables Juniors are ten-year-olds, and Seniors are eleven-year-olds.

JUNIORS

EXAMI-NATION	(a) SPECIAL CHOICE OF GIRLS	(b) SPECIAL CHOICE OF BOYS	(c) NEUTRAL
I	1 Letter about new home in town or country	2 A story called "Just in Time"	3 An account of any interesting event of previous year.
II.	4 Doctors.	5 Money	6 The Sky. 7 Furniture
III.	8 Long John Silver 9 Oliver Twist. 10 King Arthur	11 Rip Van Winkle	12 Robert Bruce 13. Captain Hook 14 Sir Francis Drake
IV.	15. Soap 16 Examinations	17 Newspapers 18 Wireless	19 Clothes 20 Advertisement Posters.
V.	21. Your favourite lesson at school.	22 Learning to ride a bicycle.	23 Every cloud has a silver lining.

A comparison is made only between subjects set for one and the same examination. It will be noticed that the choice is not always as one would have anticipated: for instance, Long John Silver is a favourite of girls, not of boys.

The following table shows the average percentage mark earned by girls and by boys on the above subjects·

JUNIORS

No of Subject	Girls' Average	Boys' Average
1	42 3	38 5
2	39 5	39 3
3	44 4	40 5
4	47 9	45 8
5	51 4	50 6
6	58 9	57 8
7	45 9	45 0
8	58 1	57 2
9	56 5	57 9
10	54 9	55·8
11	60 2	61·8
12	58 2	59 1
13	58·3	59·1
14	48 1	49 2
15	43 2	39 3
16	50 1	47·7
17	46 4	43 8
18	51 2	50 6
19	48 5	43·4
20	50 9	48·7
21	50 3	47 5
22	54 6	56 8
23	60·0	53 9

Similar tables for Seniors are on the next page.

SELECTION OF CHILDREN

SENIORS

EXAMI-NATION	(a) SPECIAL CHOICE OF GIRLS	(b) SPECIAL CHOICE OF BOYS	(c) NEUTRAL
I	1 What you would do with a magic wand	2 A famous living man or woman of any nation	3 The house, bungalow, or flat you would like to live in
II	4 Sunday	5 Water	6 Story beginning "One night last winter I dreamt."
III	7 Sounds heard in town and country 8 The importance of little things.	9 Crowds	10 Rivers
IV	11 The most interesting day of my life.	12 A story called "The Broken Bridge"	13 Describe the kitchen in your home

No OF SUBJECT	GIRLS' AVERAGE	BOYS' AVERAGE
1	50 2	46·9
2	42·0	38 7
3	50 7	39 6
4	42 3	38 1
5	50 7	47 6
6	53 1	52 6
7	51 1	48 8
8	42·7	40 8
9	43 6	42 5
10	50 8	49 3
11	42 1	40·4
12	40 2	39·8
13	43 4	40·7

It will be noticed that in most subjects (all in the case of the Seniors) the girls do better than the boys. The exceptions are (*a*) on learning to ride a bicycle, where boys have a big advantage (the examiners were surprised to find so many girls choosing this subject), and (*b*) on characters from books. Boys, generally speaking, have more opportunities for reading than girls in similar home circumstances, the girls being subjected to a heavier pressure in carrying out domestic tasks and supervising the younger members of the family

In connexion with some of the above compositions, a separate report was made on the marks given for "mechanical accuracy," a term which covers spelling, punctuation, and grammatical accuracy. We quote comparative figures for two examinations of Juniors and two of Seniors.

		TOTAL MARK	BOYS' AVERAGES	GIRLS' AVERAGES
Juniors	Exam I	14	7 5	9 1
,,	Exam II	14	7 5	8 7
Seniors	Exam I	14	7 9	8 2
,,	Exam. II	14	7 7	8 1

A detailed study of spelling-mistakes made in a fixed number of words in free composition gives the following results:

	J BOYS	J GIRLS	S BOYS	S GIRLS
Average number of mistakes	4 6	3 8	3 7	2 8
% of Candidates with no mistakes	6·4%	8 8%	7 2%	16 0%
% of Candidates with 10 or more mistakes .	8 0%	5 2%	4 4%	3·2%

It is probable therefore that the higher marks gained by girls in English composition are largely due to their superiority in the mechanics of writing, *i e.*, spelling, punctuation, and grammatical accuracy.

In comprehension tests, however (see pp. 38–42) the results are somewhat different: among ten-year-olds the boys definitely defeat the girls. This is probably due to the fact that the highly intelligent boys outnumber the highly intelligent girls (see p. 13). This preponderance of highly intelligent boys has been creamed off into Secondary schools before the eleven-year-olds' examination is held. This may account for the much closer results of the Seniors. These are the figures:

		TOTAL MARKS	BOYS' AVERAGE	GIRLS' AVERAGE
Juniors	Exam I	36	18 2	17 4
,,	Exam II	36	16·4	14·4
Seniors	Exam. I	50	23 2	23 8
,,	Exam II	40	20 1	17 3

In setting arithmetic papers the problem of the difference between boys and girls is far more serious than in setting English papers, and great care must be taken to include problems whose setting appeals to girls as much as the setting of the usual type of problem appeals to boys. As has already been noted (see p. 54) problems requiring the use of a simple diagram are for good reasons included in some test papers. Unfortunately, in many cases boys have a better chance than girls in tackling these. Many girls have one or two periods less of arithmetic than their brothers, and often, at those times when the girls are learning needlework, the boys are being taught practical arithmetic or

geometrical drawing. In other schools, the times are apparently the same for the two sexes, but the handwork ordinarily taught to the boys at the times when girls do needlework teaches them much more about the use of a ruler and rough diagrams and simple plans than does the work of the girls When needlework is taught on broad lines, with a view to its future usefulness as a medium for creating things rather than as a tool for mending things, the girls fare much better At this early age it seems a pity to differentiate too much between the boys' and girls' training and so deprive girls of a training in constructive visual imagination which they need later for real success in dressmaking, in many crafts, and in the arrangement and decoration of their homes and gardens. The fact that girls improve rapidly in this type of work with a little practice is encouraging.

One aspect of the study of comparative arithmetical results over a representative area is seen in the following figures. The boys' average mark was 49 per cent., the girls' 42 per cent. But the difference between the sexes varied from the highly significant figure of 9·4 per cent. in one district to the low figure of 0·6 per cent. in another. Another inquiry found in one large district a remarkable uniformity in the boys' and girls' results, while yet another found that the girls from one centre scored a higher average mark than the boys in any of the centres marked. It looks as if it is possible to improve girls' arithmetic by giving them the same opportunities of learning as the boys. Probably girls in mixed Junior schools fare better than their sisters in girls' Junior schools, although the investigation has not yet proceeded far enough to prove this.

Undoubtedly, however, there are certain innate differences due to sex, which the present common system of differentiated training tends to accentuate. It is, for instance, in problem work that boys score most heavily over girls The girls' papers in one recent examination were frequently most beautiful scripts, showing work set out with the utmost care, but the total mark possible on them was only 50 per cent or 60 per cent., because there was no attempt to earn more marks. Where a boy might be scoring 10 marks out of 16 for a thoughtful but somewhat untidy and slightly inaccurate attack on a problem, the girl waited until she could present something which reached the high standard of carefulness inculcated in her by her training. One does not disparage the value of clear figuring and writing in good arithmetic, but there is room also for the spirit of adventure. Many girls show this to the same degree as the boys, but in some schools girls' natural clinging to painstaking methods appears to be reinforced by their training. Modern life, whatever be its sphere, demands initiative from women as well as from men, and we owe it to girls to make their arithmetic lessons a training-ground for wise adventuring. It is clear that in districts where the emphasis in the teaching of girls has been slightly altered, their results in arithmetic can be greatly improved.

In mechanical arithmetic the girls and the boys seem to do about equally well, boys gaining the upper hand in some types of question, girls in other types. It is perhaps connected with girls' greater capacity for taking pains that the one type in which they invariably defeat the boys is long division in any shape or form. In mental work, on the other hand, the boys show a

108

superiority over the girls   It may be partly because of their greater willingness to *try* to answer, even if uncertain as to being right. It is also probably because girls have no game to compare with boys' marbles as a self-educative device for mental arithmetic. Boys' greater facility in mental work must affect for good their whole results in arithmetic examinations, since habits of good mental work save time and energy in answering questions where a certain amount of written work is a necessity.

It would appear to be true that at least part of the difference between the sexes in their arithmetical results depends on the type of mathematical education given to the girls in the schools of their district. It is possible for examiners in arithmetic to do something towards equalizing the chances of boys and girls in a test paper, by including problems of special interest to girls, and mechanical work of types which boys usually do less well than girls. To offer a choice of questions at this early age is not a good solution, as it demands a good deal of extra effort from a young candidate. It is not yet clear what part is played by innate differences between the sexes and what part by differentiated training.

IX

SECONDARY EDUCATION FOR ALL

In the preceding chapters we have limited ourselves to the selection of children for post-primary schools of the academic type which retain all their pupils to the age of 16, and a certain proportion of them to the age of 18. For the sake of convenience, and because the great majority of Secondary schools in this country are at present of this type (with slight modifications in certain directions), it appeared simplest to discuss the questions connected with the examination of eleven-year-old children in this setting · it is, moreover, the setting of which we have had the greatest experience. Much of what has been written in previous chapters has, however, direct bearing on the selection of children for any type of post-primary education As examiners for a variety of examinations, as educationists, and, which is perhaps most important of all, as citizens, we now venture to add a brief general treatment of our subject, with particular reference to the view-points of teachers and parents.

It may be well at the outset to clear out of the way one question arising out of the previous chapters. The West Riding Education Authority, under whom we have gained the greater part of our experience in examining young children, now selects its Secondary-school scholars by means of an examination which gives equal weight to English, to arithmetic, and to intelligence test: by "giving equal weight" we mean

that after applying a mathematical device to equalize the spread of the marks in each test,[1] the marks gained by a candidate in each test are added together. "Ties" at the foot of the awards list are dealt with by leaving a slight margin in the number of scholarships allowed for in the financial estimates. When, *e.g.*, about 2500 scholarships are to be awarded, a matter of twenty one way or the other can thus be dealt with. The matter is different in the case of the smaller authorities. But even in the case quoted, after all possible revision of mark-scores has been made, it is likely that some of the children at the bottom of the awards list ought to change places with some at the top of the list of rejected candidates. One or more of the factors indicated in Chapter II account for this To make a just selection from among these doubtful candidates—a narrow border-line within the wider border-line already carefully revised—the multiplication of evidence is highly desirable By what methods can this best be obtained? The present plan of some authorities, including the West Riding, of giving two chances to every child by holding examinations for two age-ranges, is one contribution to the solution of the problem.

We have already indicated that in small areas such as county boroughs, where the inspector-examiners of the local education authority can be in direct touch with all the Primary schools, use may be made of interviews, school records, and merit lists in dealing with the border-line. What can be done in areas too large to allow of such methods? We envisage a possible method on the following lines. Primary schools would supply lists of their candidates in order of merit or at

[1] See pp 83–84, 147

least classified in, say, four classes, A, B, C, and D. A standardized interview conducted throughout by the same person or persons would be applied to, say, 2 per cent. of the candidates, *i e.*, those forming the final border-line referred to above from which it is desired to select about half. On the result of these interviews the candidates would also be classified as A, B, C, or D. This two-fold grading would give us two more lines of evidence in awarding the last 1 per cent. of the scholarships. In this narrow border-line within the wider border-line the order of merit would be, it is suggested, AA, AB, BB, AC, AD, BC, CC, CD, DD. Such a method, merely outlined here, is clearly capable of refinement and improvement through practical experiment.

In these days we often hear or read the phrase used as a title for this chapter. On the other hand, we are constantly told by members of the staffs of Secondary schools that certain scholarship pupils are quite unfit for the difficult abstract part of the work of those schools. Here we have obviously ambiguity in the use of the description "Secondary" Hitherto we have given it its narrowest and still most common connotation What is its new implication as expressed in the slogan "Secondary Education for All"? While administrative and legal usage still adheres to the old meaning, the journals, newspapers, and public speakers of to-day are beginning to give it a wider application as embracing all forms of post-primary education. With this meaning in mind, a large and growing body of enlightened public opinion takes "Secondary education for all" as its ideal. This modern ideal implies that, after eleven, young people should be educated in

schools providing better opportunities than they have had hitherto, by methods better suited to their growing sense of responsibility, guided by aims more closely connected with their future life as regards both work and leisure "These schools," said Sir Michael Sadler in January, 1936, "though of different types, should all be of such admirable quality and attractiveness as to secure for them, as far as possible, an equal measure of parental and public confidence." Adolescents would no longer be taught in a department superimposed on a school designed in its equipment and staffing to give Primary education. Proper accommodation and the necessary staff and equipment would be provided in order to give a choice between the definitely practical type and the definitely bookish type of education during the last two or three or four years of school life, a compulsory extension of school life to at the least fifteen years being also envisaged in these proposals. Since few single schools can provide what is needed for their own senior pupils, the children from several Primary schools would be moved at about eleven years of age to form together one or more new school communities. Included in this modern definition of a Secondary school would come Senior schools where reorganization provides them, Intermediate or Central schools in certain areas (the nomenclature and its exact significance vary from area to area), Junior Technical, Art, Commercial, and Domestic schools[1], as well as Secondary schools in the present official meaning of that term.

Hitherto the contrast has been not between Primary and Secondary schools, but between Elementary and

[1] Entry to these practical schools is usually at a year older than to the other post-primary schools

Secondary schools. Elementary schools are free and cheaply run; Secondary schools charge fees and usually cost more to run than is produced by the fees. Where the state contributes to their cost, these Secondary schools have by law to provide a certain number of special places for suitable children, and in so doing, provide a bridge between Elementary and Secondary education. It is difficult to use freely the term "Secondary school" in its modern meaning, while there is one code for Elementary education and another code for Secondary education both of which include the age range eleven to sixteen Struggles go on in the educational world over this anomalous position. When modern speakers and writers apply "Secondary" to all post-primary schools, Senior, Central, etc., that type of post-primary school whose chief emphasis is on education of an academic type and whose success is mainly measured by the number of pupils obtaining the School Certificate, or University or other scholarships, might well be, and indeed is usually termed, a Grammar school.

Yet another complexity has been introduced into the nomenclature by the distinction which must be drawn between "Unilateral" and "Multi-bias" or "Multiple-bias" Secondary schools. Many Secondary schools of the Grammar-school type already have more than one side to their curriculum, and in actual practice different forms in such schools enter in different subjects for the School Certificate examination. Many offer Art, some Handicrafts (Woodwork or Metalwork), some Domestic Subjects, some Music, some Commercial subjects. Such subjects are taken, however, by comparatively few candidates, and training in

114

them is rarely regarded as an essential part of the school curriculum. All such schools are, therefore, still "unilateral" Secondary schools "Central" or "intermediate" schools whose work is not in general planned so as to lead to any final examination show greater variety in their curricula, but in present-day administrative practice these are not "Secondary" but "Elementary" schools The fact that a fair proportion of their pupils, educated on methods more practical than "bookish" (their mathematics, for instance, is taught as much by laboratory as by text-book methods), take the same School Certificate examinations as the Secondary-school pupils, and take them successfully, has of itself widened ideas as to methods of teaching even the so-called academic subjects As examiners for one or more School Certificate examining authorities we can vouch for the fact that at least in English and mathematics, forms from these schools often present extraordinarily good work, equal to that of the best Secondary schools. Many education authorities have no schools of this type: they are to be found mainly in the larger towns. They are important for their influence on educational thought, rather than for their numbers. They are really multi-bias schools of a restricted form, and their success, however moderate, points at least to the possibility, though there will be disagreement as to the advisability, of establishing complete multi-bias Secondary schools with Art, Technical, and Commercial added to the existing Classical, Modern, and Science sides. Such schools would be able to supply post-primary education for all of above average intelligence, and as they would be under single control their provision would facilitate correction of

mistakes made in the first classification of the children according to the type of post-primary education for which they are considered suitable

Some experiments in this direction have already been made. We know well, for instance, one famous girls' High school in the North of England, which, as early as 1908, was not only doing really advanced Grammar-school work of a standard that secured for its pupils scholarships in every type of college or university, but had a fully organized Secretarial Course, pupils from which were in great demand among the employers of the city, as well as a fully organized Housecraft Course: both of these courses were housed in suitable suites of rooms of their own, but played a large part in, and made a full contribution to, the life of the whole school community. This was an early example of what is now termed a multi-bias Secondary school. There would be difficulties in staffing such schools, not the least being the difficulty of finding a suitable Head. The head mistress of the school referred to was a unique personality, not only a scholar and administrator of distinction, but something of a practical engineer, yet wholeheartedly responsive to the calls of home and family, and with great faith in woman's capacity for work of many different kinds. It would seem essential that the Head of a multi-bias Secondary school should be a scholar, a psychologist, and a craftsman in some direction or other.

The ideal of "Secondary education for all"—we may accept or reject it—is by those interested in its achievement envisaged as being carried out in one of at least two ways. Whichever way were taken, the age for compulsory education would be raised, sooner or later,

to 16. Many types of post-primary education would be required to quote again from Sir Michael Sadler's speech, "In order to provide for the variation of talent required in the modern state, there is required a considerable diversity of post-primary schools enjoying equality of privilege and constituting together the national provision of secondary education" One plan would provide (1) Grammar schools, as described above, receiving the majority of their pupils at 11 +; (2) a system of large Senior schools, taking the residue of the 11 + pupils and providing a three- or fourfold curriculum for its different types of pupils, ranging from an A-side, giving a predominantly bookish education to those who have just failed to pass into the Grammar schools, to a D-side, giving a definitely practical education to pupils of less than average intelligence who find the study of books almost insuperably difficult; and (3) a system of vocational schools such as Junior Technical, Art, Commercial, and Domestic schools, receiving their pupils probably one or two years later, either as specially suitable members from the Senior schools or as the misfits of the Grammar schools. All these post-primary schools would alike come under a code for Secondary education. A second plan would provide (1) large multi-bias Secondary schools to take all pupils of intelligence above the average, provide them all with a good general education from 11 to 13 years of age, educate them in "sides" suited to their varying talents from 13 to 16 years of age, and finally give to a certain proportion of them a highly specialized academic education from 16 to 18 years of age; and (2) large Senior schools to take children of average or sub-average intelligence, and cater for them on the lines indicated

in (3) above, omitting the A-sides. The multi-bias Secondary school would thus cover Grammar-school education and all the types of education given in the various Junior vocational schools as well as the above-mentioned A-side of the Senior schools

By whatever methods children may be ultimately selected for entrance to these modern Secondary schools or to the different departments of the one multi-bias school, it is of the utmost importance that all concerned shall accept the different schools or departments as truly alternative courses, no one of which is superior to the other, each being designed to meet specific needs. Failure to qualify for entrance to the Grammar school would then no longer be regarded as a mark of inferiority. The introduction of anything in the way of finality at such an early stage in a child's career is strongly to be deprecated, for it involves the risk of crushing his spirit and so preventing his native ability in other spheres from coming to fruition.

From an examiner's point of view, it is interesting to note what effect the carrying out of this modern ideal on one of these two plans would have on the twin problems of the selection of Primary-school children for Secondary education and the transfer of the misfits caused by inadequate selection to schools for which they are better suited The first plan—(1) Unilateral Grammar schools, 11 to 18, (2) large 4-sided Senior schools, 11 to 14, or 15, or later, perhaps, 16; (3) Junior Technical, Art, etc., schools, 13 to 16—would necessitate the selection by examination, at about 11 years, of those children best suited for education of an academic type, but in the A-side of its Senior schools would provide an improved alternative education for

118

those who just failed to enter Grammar schools. The Senior schools would by their own internally applied methods select pupils for the various sides of their curricula. The transfer problem would be less serious than at present. Those pupils on the A-side of the Senior schools who have been for two years doing good academic work, including mathematics and French, would receive transfer scholarships to the Secondary schools: some such scholarships are already given. This would give a chance to children who develop late and to those wrongly placed in the Senior school because of the defects of the selective system. Those in the same way wrongly placed in the Grammar schools could after one year be transferred to the A-side of the Senior school, without entirely dropping their academic work, or alternatively, after one or two years could, if suitable, find a better opportunity in vocational education such as that given in a Junior Technical or Art school. The position would thus from the examiner's point of view be considerably improved by a reorganization following this first plan, especially if all these postprimary schools had the standing of Secondary schools, so that selection was in no degree a social, but entirely an educational matter. Wherever the entrance examination for fee-payers in Grammar schools remained lower in standard than the above-mentioned selective examination, an anomaly in the whole system would remain; one, moreover, which would give rise to very strong partisan feelings in more than one quarter.

The second plan—(1) the multi-bias Secondary school and (2) the Senior schools—would mean distinguishing between Primary-school children of above-average intelligence and those of average or sub-average

intelligence. A mistake in drawing the dividing line at this level would be much less serious than at present, when the line is drawn to divide the ablest children from the others: an error in judgment in drawing the dividing line at this upper level may mar a promising child's career and curtail his future contribution to the welfare of the community, whereas it is likely to make comparatively little difference at the lower level. The niceties of selection and transfers would be left to the multi-bias Secondary school to carry out for itself, individuals being safeguarded by their parents' interest, care, and, if necessary, protests.

On this second plan, one can imagine that the use of a good group intelligence test in the Primary schools, together with a system of Primary-school records and reports, based on tests which have taken proper account of birthday inequalities, would safely select at least three-quarters of those passing to the multi-bias Secondary school, finer points in discrimination being left to the Secondary school itself. The doubtful 10 per cent. to 25 per cent. of the selected children would present numerically even to the largest authorities a much less serious problem than that of the present educational situation. Parents would have a right of appeal from the local schools to the central authority for the area. The method of a standardized interview might be used, supplemented in the few most doubtful cases by an individual intelligence test. Standardized achievement tests might be used, or the central authority might, as now, conduct an external examination which would, however, be taken by a meagre fraction of the present number of candidates. Great changes in the methods of selection for post-primary

120

education might thus take place, and this plan for reorganization is a tempting one to those dissatisfied with the present method of selecting children for Secondary schools by a Junior scholarship examination.

Perhaps it is natural that professional examiners find it difficult to envisage selection for post-primary schools as taking place without the aid of the experts in their own line. They are, however, thoroughly dissatisfied with a state of things that exposes children to all the chances of the examination system, whereby careers are often decided without any attempt at multiplying the kinds of evidence which should help in the decision . but schemes for utilizing the verdict of the schools come very slowly. The great desire of the expert examiner is for more and more co-operation in his work with schools of all types. As with many other matters, perhaps the new generation, now in its twenties, will step in and solve the problems ten or twenty years hence. Meantime our great need is for fluent thought on the whole subject, all of us ready to learn from every piece of experience. And any experiments in the way of classification carried out in a small district should receive most sympathetic treatment, their results being collated for future guidance.

X

THE TEACHERS' STANDPOINT

BEFORE concluding this survey of our subject, we venture also to glance at it from the special standpoints of the teachers and of the parents

The vast majority, if not all, of the teachers of this country regard the problem of selection for post-primary education with the single-hearted object of doing their best for all the children in their care. If the views of some of them have become narrowed to the single object of obtaining a more or less academic Grammar-school education for as many of the children as possible, the fault does not lie with them, but with our educational system, which, at least until very recently, has been built upon the assumption that such an education is the most desirable We have had our much-vaunted educational ladder with its rigidly fixed and spaced rungs quite unsuited to many of the little feet set upon it. We have envisaged a future with a greater variety of post-primary courses of study, alternative post-primary schools each with its own special aim and outlook, each supplying the needs of different groups of children and—this is of vital importance—all of equal status. Under such a system every child would have open to him a roadway leading to complete development of his special individuality.

Since the Primary-school course must precede several different types of post-primary education, its syllabus should be drawn up, and what is even more important,

but does not always follow, should be carried out, without any special reference to whatever type of tests for admission to Grammar schools the children, or some of them, will be called upon to undergo. This can only be achieved through the co-operation of the teachers, the Local Education Authority, and the examiners At present the chief concern of the Local Education Authority and the external examiners is to provide an examination or examinations which shall select from Primary-school children those who are suitable for the present type of Secondary school It is feared that some teachers allow this examination to loom too large in the organization of their schools. but it is most important that the children should take these examinations in their stride to the exclusion of anything in the way of special coaching.

The evils of cramming and of special preparation are widespread. proof is constantly cropping up in the course of examinations. For instance, children who were asked in a composition to describe how they had spent the day before the examination revealed the fact that they had been receiving special coaching—at this late hour—for the examination. Oral examinations have shown the same state of affairs. The remedy is mainly in the hands of the teachers, and when they can be convinced that it does not really help the children, they will no doubt abandon this special coaching. To get rid of the fee-snatching external crammers we must look to the parents, who must be brought to realize that they are not acting in the best interests of their children in submitting them to be stuffed for their examination like geese for the Christmas slaughter.

It is the real cramming which is to be condemned,

for the children should certainly, as part of their training, be familiarized with tests of various kinds and with working to a time limit. Such training will ensure that the children shall regard examinations as an ordinary part of school work and not as the horrible bogeys that haunt the minds of many of them nowadays. They should be trained to aim at improving on their own performances instead of measuring them by those of other children Such systems as the modern Dalton plan, where the children are called upon to pass a series of tests, can be taken as a guide, and children as young as eight or nine will be intensely interested in collecting, perhaps in folders they have made in their handwork lessons, the records of their performances in tests held at intervals of a month or a term. It is realized that there are great difficulties attached to such methods in small schools where children whose ages range from five to eleven or even five to fourteen may be taught by two persons in one room. It is not, however, beyond the bounds of possibility to arrange short tests for the older children when, say, it is fine enough for the younger to work or play out of doors, or take a school "walk" for a lesson in nature study or topography. It is the right attitude to tests of teachers, parents, and children that we wish to emphasize, that all should regard them as a natural and regular part of school work, a reliable and therefore valuable record of a child's progress according to his own ability, not as compared with the ability of his classmates. Standardized attainment tests in English and arithmetic, such as those of Burt and Ballard, may be used to provide an accurate measure of the progress made by a child from term to term: they will also show whether a

child's ability is below, level with, or above that normal to his age Children take a delight in these records of their progress, and records covering, say, the last two years of Primary-school life may be of great value in deciding on doubtful cases in the examinations which select for the different types of post-primary education. While time limits must not be allowed to press too heavily on children, their natural delight in contest, especially in races, can be enlisted to encourage them to "get up speed" in such matters as easy addition, subtraction, multiplication, and division sums and simple problems in arithmetic, and in such English exercises as finding suitable missing words, changing from present to past tense, singular to plural number, or positive to negative statement. Here drill work is of vital importance, rendering the child so secure in his fundamental habits of calculation, writing, and spelling that he will, without being unduly upset, withstand the unusual stress—which is to some extent inevitable— associated with an external examination. Drill work and speed tests can be great fun. Experience in preparing children over a period of years for a great variety of Secondary-school entrance and scholarship examinations compelled one to realize the fundamental necessity for drill work as part of the system of teaching both arithmetic and English Under it all sorts of children, quick and slow, flourished and were happy. The school use of standardized attainment tests will of itself emphasize not only the value of speed and drill, but also the necessity of teaching all aspects of English and arithmetic in a well-balanced whole by methods which have been proved to be the best because they have produced the best results.

So far, then, would we allow preparation for the examination—a very different thing, it will be realized, from the kind of cramming and special preparation which is referred to throughout this book and which cannot be too strongly condemned.

Professor Cyril Burt, in *The Subnormal Mind* (1935), in discussing the causes of "backwardness" in school children, mentions the debilitating effects of over-pressure on the less able children in our schools (pp. 126–127). He points out that the examinations for Junior County scholarships are often cited as an excuse for this over-pressure, and suggests how ridiculous it would be to maim many children in the effort to discover the brightest two or three per cent. of them. Much can be done to frustrate the crammers, as he points out, by setting questions for such examinations which depend on native intelligence rather than on acquired attainments: but, he continues, "unfortunately many scholarship papers are still set which are very largely tests of what the child has been taught. Now when schools have been reorganized on the lines of the Hadow scheme, the Junior Department no longer contains any of the higher standards, and this necessarily means that the general mass of the children in the lower standards are forced to do work that is really above the heads of all who are not of exceptional intelligence. The result is that the average children may do a little better than they should do in the scholarship examination, but the dull child is penalized still further and suffers a greater strain. The system not only manufactures spurious scholarship-winners, but also spurious instances of mental backwardness and failure in the simplest subjects." Such an indictment from such an authority lays

a heavy responsibility on the examiners, on the Local Education Authority, and on the Heads of schools.

It is not easy, be it said, to decide these matters wisely. Take a concrete illustration Many of us believe that the teaching of decimal notation should be begun at an average age of $8\frac{1}{2}$ with the use of tenths of an inch in handwork; that it is easier than much of the work begun early; that because of the difficulty and importance of decimal work for older children its foundations should be laid early and soundly as they are in countries using a metric system of weights and measures. We have ourselves seen children of such an age take decimals in their stride, without any strain extending their decimal notation to three places at the age of ten, and at eleven using sensibly methods for easy long multiplication and division of decimals. If examiners cease to expect simple decimal work, we fear we shall, by inviting neglect of decimals, have a bad effect on the teaching of arithmetic in a great number of first-rate well-organized schools. But we are regularly met with the plea that many schools do not teach decimals, they have not the time, that ten-year-olds have to be taught with nine-year-olds and eleven-year-olds with ten-year-olds, that children come up from Infant schools to the Junior schools so late that they may be in the Junior school less than two years before they have to take the external examination. In truth, less and less of a syllabus is to be expected every year.

Whatever be the rights or wrongs of the decimal business, it is a matter to be decided, not by examiners, but by Primary and post-primary teachers of experience in conjunction with the inspectors of the Local and Central Educational Authorities. It is, however,

a matter of importance to examiners, because it and similar matters affect the efficiency of their work, and the fact remains that something is wrong if children of ten and eleven now learn a good deal less than they did from five to ten years ago: the new organization would seem to have done harm instead of good. To comparative outsiders like ourselves the crux of the matter seems to be the age of transfer from the Infant to the Junior school, and behind that the fixing of head teachers' salaries by the number of children in their schools. The age of transfer is, one believes, supposed to lie between 7 years 1 month and 8 years 1 month on September 1, promotion being made only once a year (see Chapter VII, "The Birthday Problem"). The child promoted at 7 years 1 month takes his ten-year-old external examination when he is about $10\frac{1}{2}$ years old, that is, after a period of about $3\frac{1}{2}$ years in the Junior school, which is ample time The child promoted at 8 years 1 month (because of his birthday date) takes the same examination, also when he is about $10\frac{1}{2}$ years old, but he has only had $2\frac{1}{2}$ years in the Junior school, a great handicap due solely to the chance of the time of the year he happened to be born. A system of age allowances, however, meets this handicap.

This is not the worst. Although the average age of transfer is thus 7 years 7 months, when Standard I is in the Junior School, yet when Standard I is in the Infant school, which is for some reasons desirable, the average age of transfer is 8 years 7 months, and the child born in July will not reach the Junior school until he is 9 years 1 month old · he will have to take his ten-year-old examination only $1\frac{1}{2}$ years later Four years in an Infant school, followed by two years in a Junior school

128

and by from three to five years in a post-primary school, seems a poor allocation of a child's educational opportunities. It would appear to be an absolute necessity to devise some method of promoting the more promising and the older children at the middle as well as at the end of the school year Moreover, in connexion with the work done in the Infant schools it is of vital importance to the children's future welfare, whether they be taking an external examination or not, that there be proper co-operation between Infant and Junior schools, not only between two standing side by side, but between the Infant schools and the Junior schools of any one district Schemes and methods must harmonize. No child can take an examination, even of the best type, in his stride, if they do not

Two of the most important and difficult problems facing the teacher, then, are those of syllabuses and promotions, the two being intimately connected. No rigid syllabuses or rules for promotion can be drawn up which will fit the varying needs of the different types of schools from which the children who are to be selected for further education come. There are, besides the Junior school, the preparatory department of the Grammar or High School and the private school. Some of the Primary schools, moreover, especially in rural areas, work under such difficulties of staffing and accommodation as to make it necessary that they should work out their own salvation in their own way. One large Education Authority attempts to meet their needs by giving in the examinations for special places mark allowances to children from "schools of special difficulty." The amount of the allowance is fixed according to a classification drawn up by the Authority's

I   129

inspectors of Primary schools. Such a scheme is undoubtedly infinitely better than ignoring the question altogether, as is done, it is feared, in many districts; but it cannot be regarded as an entirely satisfactory solution of the problem.

It has been pointed out that Heads of Grammar schools are now producing order-of-merit lists which closely approximate to the lists compiled from the candidates' performance at the School Certificate examination. It may also be suggested that Elementary teachers could train themselves to compile equally accurate lists, and that therefore the task of selection might be left to them The objections to this have already been referred to, but classification by the teachers would certainly play an essential part in the ideal process of selection. The necessity for such classification should give the teachers a closer interest in the children, and all good teachers would welcome the work and responsibility entailed; for these would be offset by the satisfaction of realizing that it is within their power to give each child under their care the very best chance in life available for him. Whatever other tests are employed for selection, the comparison of the two classifications, the teacher's and that founded on the prescribed tests, will be increasingly interesting and helpful to the teachers, and as they approximate more and more to each other—as they undoubtedly will—the task of final selection will be correspondingly lightened.

Teachers can, and should, also play a big part in the actual conduct of whatever tests are used. Valuable experiments are being made in this direction all over the country. Some of us know, for instance, how the Northumberland Authority gives one set of tests on a

given school day in the children's own schools to all between eleven and twelve on a given date, arranging for that day a general post of their head teachers so that no one is actually responsible for the examination in his own school The tests used are a group intelligence test and standardized tests in arithmetic and English consisting of a great number of short questions admitting of answers which are as simple to mark as intelligence tests. The teachers, using the keys provided, mark the tests on the examination day and forward the results to the Authority, which in due course, after completing the necessary statistical work, can (1) compare any one school with any other and where possible suggest lines along which future improvement may be achieved; (2) after checking the marking of the best candidates' work, provide for each school a list of pupils to proceed to (a) Grammar Schools, (b) Central or Junior Technical Schools, (c) Senior Schools. At this stage the schools' reports on the school work and comparative ability of these children are received and compared with the lists based on the results of the tests, in an effort to make as wise a transfer as possible. The West Riding Education Authority has for some years been using and developing a system of decentralization of the work of the examination, whereby the full co-operation of the teachers is obtained. An examination council with power to make recommendations to the Higher Education sub-committee has been formed on which both Secondary and Elementary teachers have full representation This council considers the conduct of the examination in general and the question papers, schemes of marking, qualifying-standards, etc., in detail. In addition, teachers nominated by local com-

mittees serve as assistant examiners or as added members of the special sub-committee of the Examinations Council which considers the marking-schemes. Only those who have worked as chief examiners under some such form of decentralization as is outlined above can fully appreciate the enormous importance of being in close and constant touch with the teachers and through them with the children. The work the teachers do in this way is invaluable, is essential; their co-operation is welcomed by all external examiners who really understand the difficulties of their task

The task of the teachers is, then, in the first place to carry on the work of the Primary school according to their various syllabuses, not omitting to familiarize the children with the mechanics of answering tests, learning as much about them as possible from every angle, with no predetermined ideas, except in a few outstanding cases, as to the type of post-primary education to which each child will eventually pass, certainly with no special cramming of a few doubtful aspirants for Grammar-school education. They will also take as full a share as is practicable in the conduct of whatever selective tests are applied. Their classification of the children will be all the more accurate as they come to realize the important part it will play in final selection, and the majority of them will be glad to feel that the onus of deciding on doubtful cases is not on them alone. The essence of the whole business is to secure complete co-operation between the teachers and the Education Authority, the latter being understood to include all those persons such as external examiners who may be appointed to assist in carrying out the process of selection.

XI

THE PARENTS' STANDPOINT

IT has been remarked that a child's fitness for one or the other type of post-primary education depends partly on native ability, partly on attainments. But there are other factors just as potent, though often overlooked. In this chapter we shall refer to those two factors with which parents have most to do, viz. (*a*) the conditions of the home, (*b*) the physical make-up of the child. Here we merely touch on a number of different points connected with these factors: what we want to emphasize is the fact that no system of selection for post-primary education which ignores them can be entirely successful.

Much splendid work is being done to remove or at least to reduce the disabilities under which children from poor homes work; but in spite of school clinics, free meals, regular allowances of milk and cod-liver oil, and all the other modern methods of alleviating the worst conditions, children still suffer from inadequate and faulty, especially faulty, feeding. Such things as the occupation of the father may easily throw arrangements for the family meals out of gear: when, for instance, miners work in three shifts, it is sometimes very difficult to provide an adequate midday dinner for the children. It is often essential that the provision of a good school dinner should form part of the maintenance grant allowed to poor children who are awarded special places in Secondary schools. Interviews with border-line candidates sometimes show clearly that a child has fallen

below his correct place in the awards list because of lack of nutrition. A sympathetic experienced head master has been heard to remark at such an interview, "All that child needs is a good midday dinner five days a week."

We all know when we read the annual appeals for clothing, especially boots and shoes, for poor children, how pitiably inadequately many of them are clothed. A poor parent often fears to accept an award of a special place for his child because of the clothes difficulty, especially if the home is at some distance from the Secondary school, so that adequate protection from bad weather is essential   It is true that many enlightened education authorities go as far as they can to meet this difficulty by giving clothing-grants; and we have known Heads of Secondary schools who go out of their way to assist parents and children in a wise outlay of the grant: but this handicap of children from the poorer homes remains a very real one.

It is the parents' particular and often very difficult duty to see that their children have a sufficiency of healthy, happy leisure and open-air exercise. It is right that children should help in the home, but the amount of help expected from them varies enormously from home to home. That it should do so is, of course, unavoidable, but it is a matter which parents would do well to consider carefully. The tasks moreover should be shared by all the children, irrespective of sex, according to their age. We hope that the days when the boys got off scot-free, while the girls had scarcely any leisure from their duties of nurse and domestic help, have gone for ever. We have seen signs that they have, for in an entrance examination where the children were asked

to describe the kitchen in their home, among the boys who chose this subject were several who related with great pride how they were allowed to scrub the floor for mother on Saturdays. One, it is true, less domestically inclined perhaps, expressed great distaste for this task for, as he said, "corncrete takes a lot of scrubing." But while the parents may be encouraged to limit their demands on the children as much as may be possible, those responsible for selection for post-primary education cannot afford to ignore the varying circumstances of each child in this connexion. The number of rooms in the home, the number of inmates, and similar circumstances are all factors to be reckoned with. Those scholarship children whose work falls off in the Grammar school are sometimes suffering from disabilities of this kind. In this connexion the various attempts being made up and down the country to abolish or curtail or reorganize homework are of great interest and value: where, however, such a system involves extended school hours, its effect on the children must be very carefully watched.

Another essential of a child's welfare which only a parent can provide is a sufficiency of healthy sleep. Very few children to-day in any class get this. Over-indulgence in the cinema and broadcast entertainment, as well as pressure of homework, help to reduce the number of hours available for complete mental and physical rest. Parents as well as teachers must help the children to regard the examination as something to be taken in their stride; but often, through over-anxiety, parents fuss unduly over their children, working them up to a highly nervous and excited state, so that they are quite unfit to provide by their work on the examina-

tion day a true picture of their natural ability, leanings, or even attainments.

What then is the bearing of all these things on the problems we are now considering? One side of the question has already been noted: satisfactory selection of post-primary education suitable to each child cannot be achieved if home circumstances are ignored. Some investigation has been made here and there into the influence of home circumstances on ability and attainments, but much remains to be done. It is admitted that the difficulties involved in such investigations are very great, but they should not be insuperable Teachers, social workers, ministers of religion, attendance officers, members of local councils, etc., should by friendly co-operation be able to evolve some method of classification which might form a basis for research into this most important problem. In all these matters the key-note should be co-operation between parents and teachers, but examiners and all responsible for the organization and control of examinations have also their part to play.

We have already expressed a hope that parents will be brought to see how inimical to the whole future welfare of their children may be the resort to crammers, who sometimes even guarantee to get the children through their examination for a fixed fee. Here is a typical example of advertisements which are to be found in the local Press during the months preceding the examinations for entrance to Secondary schools:

> SCHOLARSHIP EXAMINATION for entrance to
> . . . SECONDARY SCHOOLS.
> Coaching-class held on Saturday mornings and on some evenings by successful experienced Teacher; moderate fee. Write A. L. 92.

With the improvement of examination methods which we confidently look for, it will become increasingly impossible for crammers to get children who would otherwise have failed through the examination concerned: granted, however, that they can really achieve what they promise, it is hoped that parents may be brought to realize that it is entirely against a child's best interests to impose upon him a type of education for which he is demonstrably unfitted. In this matter examiners have a part to play by setting papers of such a nature as to frustrate the efforts of the crammers

How far, then, can tests be set which shall give equal chances to children from varying types of homes, or rather which shall ensure that every child shall get the education for which he is best fitted, having regard to his whole make-up and to all the circumstances which influence it? It may be said at once that such tests are an unattainable ideal: but more could be done in this direction than is done at present, for some education authorities and some examiners are content entirely to ignore this aspect of their task   For example, tests set to children of eleven and twelve years old are often far too long and demand too high a working-speed from those who have had few opportunities outside the school of developing powers of concentration. Some tests again ignore the importance of beginning the paper with some sort of question which the children can tackle straight away, thus achieving confidence and tranquillity for the more difficult questions   The problem of devising tests which shall eliminate as far as is advisable inequality of chances due to home environment is a very vital one. Especially in English is it impossible to evade the influence of the home, but many

examinations seem framed to give it more weight than is necessary.

Conditions mentioned so far affect the welfare of all children alike, even of the average healthy child. The task of some parents is more difficult: they have to provide the best possible conditions for children suffering from weak hearts, nervous disorders, tubercular tendencies, faulty vision or hearing, etc. In these matters wise parents will welcome and co-operate with school doctors, dentists, and nurses. But consideration of defects of this kind is not all that is needed: there should be some attempt at discovering other characteristics, less tangible and therefore less easily detected. Staying-power and perseverance, for example, are very important factors, as are the lesser nervous affections so often unnoticed. Shyness is fairly easily detected, but a reserved child is often completely misunderstood. All of which leads us to say that some attempt should be made to get at the individual temperament so that at least, as an extreme example, the child with a keen imagination, a love of poetry, an instinctive repulsion to manual activities shall not be sent to the Junior Technical School, or the child who is never happy unless making something to the Grammar School.

It is realized that the ideal of a thorough and complete investigation into the environment and physical and mental make-up of every child is as yet only an ideal, but these questions have been referred to, firstly because they are often completely ignored, and secondly to urge still greater co-operation between parent and teacher in deciding on a child's future education. The teacher's burden is at present too heavy a one for him to be able to undertake much in the direction we have

indicated, but with an improving world of education where classes shall be smaller and Heads relieved of some of their teaching-duties, it will be increasingly possible for more attention to be given to these very important matters. Meanwhile the parents' task is first to do all they can to improve the conditions under which their children grow up into full citizenship, and second to help the teachers fully to understand those conditions.

We set out to write this little book with the object of interesting a wider public in some of the problems connected with the selection of children for post-primary education. We believe that the greater the number of serious critics of the present position, the more quickly shall we arrive at a solution satisfactory alike to the child, the parent, the teacher, and the community.

APPENDIX A

EXAMPLES OF GRAPHS USED IN EXAMINATION STATISTICS

In all examination statistics two types of graphical representation of the results of the candidates are of great value. The mathematical equations to these graphs are complicated in nature, but the actual drawing and use of them under certain conditions is possible to those with only an elementary knowledge of mathematics Such an elementary knowledge of the construction of an ordinary graph is all that is assumed in the following section. Those who desire further knowledge can find it in any good book on statistics.

I. COLUMN GRAPHS OF MARK DISTRIBUTIONS

We use a column graph to indicate the spread of the marks among the candidates taking the paper or combination of papers in question. As an illustration, we may use the English marks given by the examiner whose analysis form was printed on p. 68. In order to be able to compare the results of examiners marking different total numbers of scripts, it is usual to plot the distribution by using the percentages of candidates falling within the various mark ranges: see 1.6 of the analysis form.

Mark Range	0–9	10's	20's	30's	40's	50's	60's	70's	80's	90's	100	Total
Percentage of Candidates	0 4	3 4	7 6	17 0	22 5	22 1	16 6	7 0	2 8	0 6	0	100
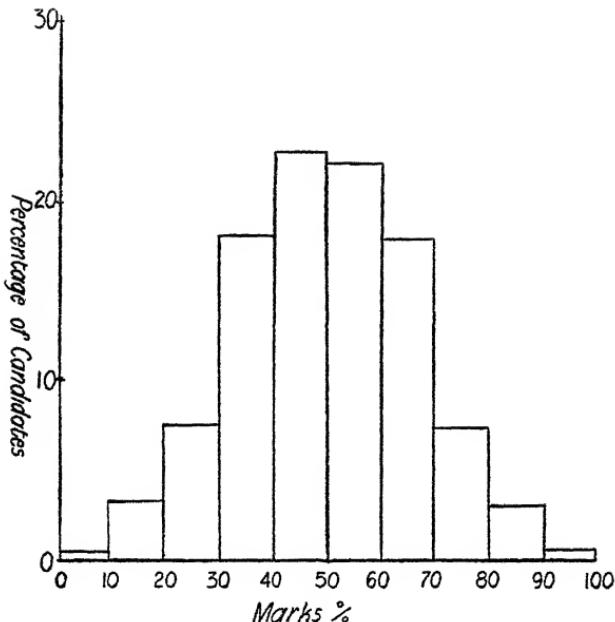
A shortened form of this representation can be made by ascribing to each of the separate ten groups of candidates what is approximately the average mark of the group: for instance, we give to the group whose marks lie between 20 and 29 an average mark of 24·5.

Average Mark	4 5	14 5	24 5	34 5	44 5	54 5	64 5	74 5	84 5	94 5
Percentage of Candidates	0 4	3 4	7 6	17 0	22 5	22 1	16·6	7·0	2 8	0·6
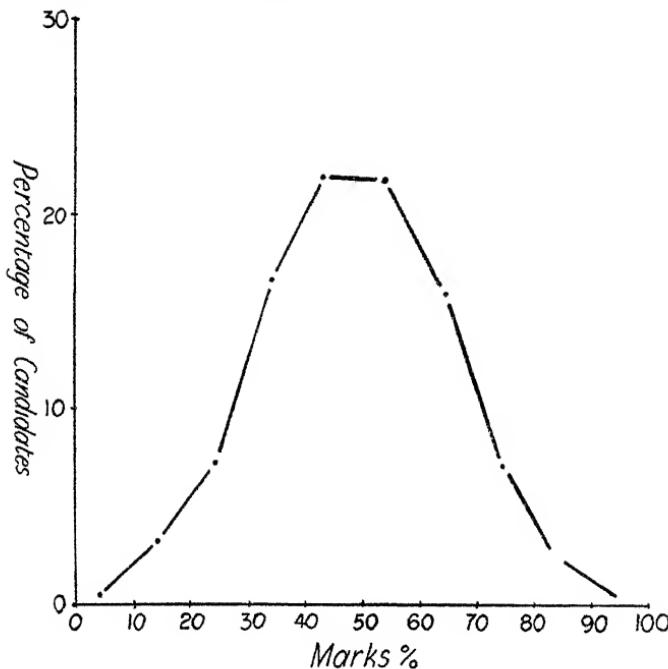
This shortened form of representation has been used in the examples on p. 71 If all the children of the required age over a large area were taken and it proved just as difficult to secure 70 marks as it was easy to secure 30, and so on, the above representation would take a form something like a bell symmetrically placed about the vertical line passing through the point which reads 50 marks. In an examination designed to pick out very able children from those less able, usually more children fall below the half-mark line than rise above it: in such a case the bell or peaked-hat is "skewed" to the left of the middle vertical line. If too easy a paper is set, or if the marking is too lenient, the bell or peaked hat is skewed to the right, because of the large numbers who secure more than half marks. The above example

is skewed a very little to the left We may note also that in this case the peak of the hat has become something like a plateau · this means that the marks are well spread out among the candidates Where an examiner shows little ability to discriminate between candidates, as many as thirty per cent of them may lie within one group of ten marks, and the hat develops a sharp peak, which is an instantaneous danger sign to the chief examiner checking that assistant's marking

II PERCENTILE CURVES FOR MARKS OBTAINED BY CANDIDATES '

To the tables of the two lines given in the preceding section, we may add a third line to show the total percentage of the candidates gaining less than 10 marks, less than 20 marks, less than 30 marks, and so on 100 per cent. of the candidates must have less than 100 marks in the case illustrated above The reasoning goes like this:

    0 4% of the candidates had marks under 9

    3 4% of them had marks between 10 and 19 · or 3 8% of them had marks under 20

    7 6% of them had marks in the twenties · thus 3·8% + 7·6%, or 11 4%, had marks under 30.

The table may be put in two ways, the first showing more clearly the construction of the third line, the second showing more clearly its meaning.

Mark Range	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100
Percentage of Candidates	0 4	3 4	7 6	17 0	22 5	22 1	16 6	7 0	2 8	0 6	0
Cumulative Percentages	04	3 8	11 4	28 4	50 9	73 0	89 6	96 6	99 4	100	

Each item in the third line is obtained most easily by adding to its preceding item, itself a total, the percentage for its own column. We give the other form of the same table, omitting line 2.

Marks under	10	20	30	40	50	60	70	80	90	100
Percentage of Candidates	0 4	3 8	11 4	28 4	50 9	73 0	89 6	96 6	99 4	100

The curve representing this is of a totally different form from the peaked-hat variety   It is called a percentile curve, and from it much valuable information can be read off which even with a roughly drawn curve will be approximately correct. We give the curve for the above table
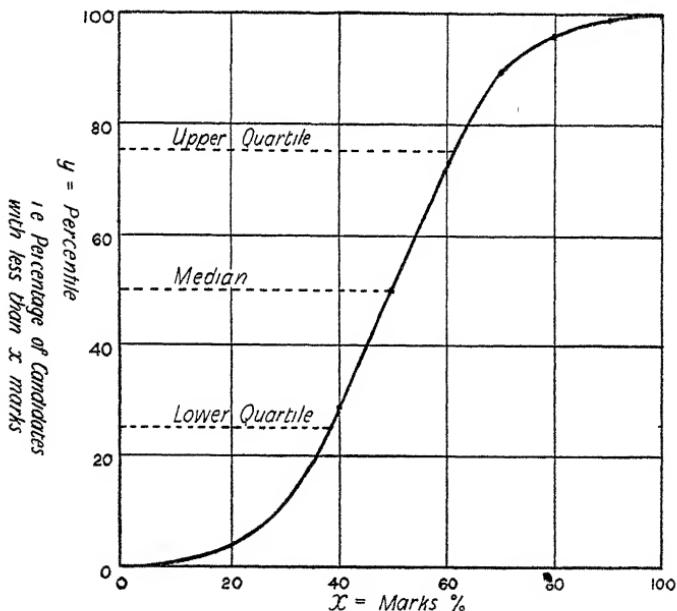
Having drawn a percentile curve for the results of a certain examination, we can find

(i) the mark which cuts off 50 per cent of the candidates: such a mark is called the median mark. In this case it is 50 per cent.

(ii) the mark which cuts off one-quarter of the can-

didates, called the lower quartile, and the mark which cuts off three-quarters of the candidates, called the upper quartile   In this case the marks are 38 per cent and 62 per cent   The difference between them is called the inter-quartile range, and half this difference the quartile deviation   In this case the inter-quartile range is 24 per cent , and the quartile deviation is 12 per cent   It is clear that the size of the quartile deviation is some measure of the extent to which the marks in any examination are spread   Further information about the spread of marks in an examination can be found in a book on statistics here we merely indicate one simple measure which can be easily deduced from a percentile curve.

(iii) approximately how many candidates will tie for any mark at different parts of the range of marks   For instance, by finding the points on the curve for which $x = 60$ and $x = 65$ marks, we may read off the percentages of the candidates obtaining less than 60 marks (in this case 73 per cent of them) and the percentage of the candidates obtaining less than 65 marks (in this case 81 per cent.).   The difference between these two readings, or 8 per cent. of the candidates, stands on the five marks between 60 and 65, so that for each mark we may expect a tie of approximately 1·6 per cent. of the total number of candidates.

(iv) the number of the candidates who obtained less than, say, 65 per cent. of the marks   In this case we find that 81 per cent of the total number of candidates obtained less than 65 marks.

(v) approximately the mark required for an award if, say, it has been decided that about 20 per cent. of the candidates are to have awards   Reading from the curve we find that 80 per cent of the candidates have less than 64 marks, from which we deduce that the mark cutting off about 20 per cent of the candidates is approximately 64.

Apart from these uses of any one percentile curve, the place of percentile curves in examination statistics may be illustrated in three different ways:

GRAPHS IN EXAMINATION STATISTICS

1 *Adjustment of English and Arithmetic Marks* (*see p* 83)

Briefly put, the method is this Take a certain number of candidates, say about 700 Mark their English papers and
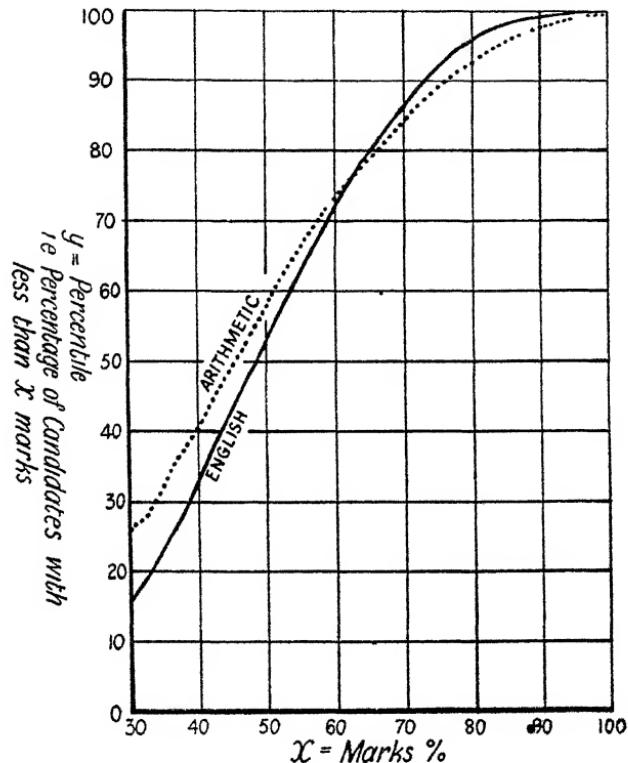
also mark their arithmetic papers. Make tables of the spread of marks for each as on p 68, and also a table of the cumulative percentages as on p 144 From this draw on the same paper percentile curves for each subject. We give the main part of two drawn from the results of 994 eleven-year-old candidates who took examinations in English and arithmetic on the same day.

From these curves we deduce that candidates about one-tenth of the way down the order-of-merit list (Percentile $=$ $y = 90$) get 73 marks in English and 76 in arithmetic. For $y = 95$, the marks are only 78 in English but 85 in arithmetic Towards the bottom of the list, say three-tenths of the way from the bottom, where $y = 30$, English marks are 38, but arithmetic marks only 34. In order to make sure that candidates good in English do as well as candidates good in arithmetic, we must so adjust the marks that the candidates one-twentieth of the way down ($y = 90$) have the same mark in both, those three-twentieths of the way down ($y = 85$) the same in both, and so on. We can make the necessary adjustment from the two curves, changing either English marks into arithmetic ones, or arithmetic ones into English, or both into the marks on some standard percentile curve specially designed to suit some special purpose of the examination The sound construction of such a standard or ideal percentile requires mathematical

ARITHMETIC MARKS	ENGLISH MARKS	
Enter original mark as given on script	Mark on script	Enter as
	40	36
	41	37
	42	38
	43	40
	44	41
	45	42
	46	43
	47	44
	48	45
	49	47
	65	66
	66	68
	67	69
	68	70
	69	72
	70	73
	71	74
	72	75
	73	76
	74	78

GRAPHS IN EXAMINATION STATISTICS

skill and knowledge, but the simple device of changing English marks into arithmetic ones will give the two subjects equal weight instead of giving the greater weight to arithmetic, and will also give a better spread of the combined marks, so reducing the size of ties We give two parts of such an adjustment table as read from these curves In this case the marks for English have been adjusted to the marks for arithmetic.

Such a table, be it repeated, ensures that candidates occupying the same positions on the order-of-merit lists for English and arithmetic separately shall have the same mark.

2. *Discovery of Appropriate Age Allowances*

Suppose that of 610 eleven-year-old candidates taking an examination 145 had ages of $11-11\frac{1}{4}$ years, 153 had ages of $11\frac{1}{4}-11\frac{1}{2}$ years, 153 ages of $11\frac{1}{2}-11\frac{3}{4}$ years, and 159 ages of $11\frac{3}{4}-12$ years In order to equalize the entries, the best 145 of each quarter would be taken, it being assumed that those missing from the lower entries had not been entered because they were less able In the case of an examination which tested all eleven-year-olds and not merely a selected fraction of them, all the cases for each quarter would be counted in. In the case of the 610 selected candidates taken as an illustration, this table can be completed, giving the percentage of candidates securing each set of marks.

QUARTERLY DISTRIBUTION OF MARKS FOR ELEVEN-YEAR-OLDS

MARKS	0-9	10's	20's	30's	40's	50's	60's	70's	80's	90's	100	TOTAL
Years												
$11-11\frac{1}{4}$	2 1	5 0	16 5	24 3	20 7	20 0	9 3	2 1	0	0	0	100
$11\frac{1}{4}-11\frac{1}{2}$	0	0	4 3	22 9	29 3	27 1	12 1	4 3	0	●0	0	100
$11\frac{1}{2}-11\frac{3}{4}$	0	0	2 1	20 7	25 7	24 3	17 2	10 0	0	0	0	100
$11\frac{3}{4}-12$	0	0	0	14 3	28 6	23 6	21 4	12 1	0	0	0	100

This table, with its absence of any entries above the seventies, shows that all the brilliant children had already received awards as ten-year-olds For each of these quarters a table of cumulative percentages can be made, exactly as described on p. 144, and from each of these four tables a separate percentile curve can be drawn on one and the same sheet of

149

paper. They look like the following diagram, and clearly illustrate how age improves the performance of the groups. They also show that there is a greater difference in marks towards the middle of the order-of-merit lists (percentile = $y = 50$) than towards the top of the lists ($y = 93$). The bottom parts of these percentile curves are unreliable because the lowest candidates have been omitted in order to
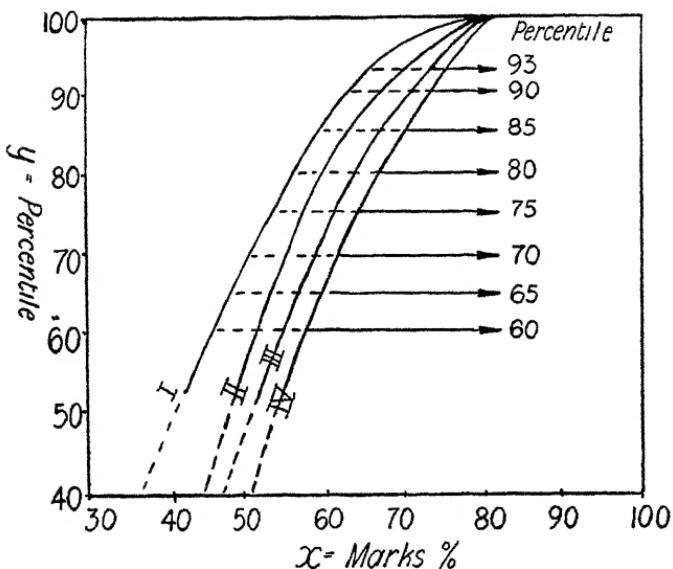
equalize the four entries; this would not matter in a competitive examination, as only the best candidates would in any case secure awards.

The lowest curve, marked I, represents an average age of 11 years 1½ months, while the highest curve, marked IV, represents an average age of 11 years 10½ months. Thus the difference between the two at each stage on them is that due to a difference of nine months in age Reckoning the last of these nine months as receiving no bonus, the first of them must receive eight monthly bonuses. From these curves we may make a table similar to this:

GRAPHS IN EXAMINATION STATISTICS

PLACE ON LIST APPROXIMATELY	PERCENTILE y	DIFFERENCE IN MARKS BETWEEN I AND IV	EIGHT MONTHLY BONUSES	ONE MONTHLY BONUS
$\frac{1}{14}$ way down	93	9 6 marks	9 6 marks	1 2 marks
$\frac{1}{10}$,, ,,	90	10 4 ,,	10 4 ,,	1 3 ,,
$\frac{3}{20}$,, ,,	85	10 6 ,,	10 6 ,,	1 32 ,,
$\frac{1}{5}$,, ,,	80	10 8 ,,	10 8 ,,	1 35 ,,
$\frac{1}{4}$,, ,,	75	11 0 ,,	11 0 ,,	1 37 ,,
$\frac{3}{10}$,, ,,	70	11 0 ,,	11 0 ,,	1 37 ,,
$\frac{7}{20}$,, ,,	65	11 4 ,,	11 4 ,,	1 42 ,,
$\frac{2}{5}$,, ,,	60	11 8 ,,	11 8 ,,	1 47 ,,

This table tells us that the youngest candidates of eleven near the top of the list (percentile 93) should receive a bonus of 1·2 × 11 marks or 13 marks (see pp. 88–95), those about one-tenth of the way down the list, say 700th in an entry of 7000 eleven-year-olds, should receive a bonus of 1 3 × 11 marks or 14 marks, those about one-quarter of the way down the list, say 1750th in an entry of 7000, should receive a bonus of 1·37 × 11 marks or 15 marks The candidate one month older should receive ten times the one-monthly bonus, the candidate two months older nine times the one-monthly bonus, and so on

But those responsible for making out the list of awards do not have the candidates arranged in a long order-of-merit list: what they know about each is his mark, to which they now wish to add, as required, an age allowance. It is very easy to change from percentiles or place on order-of-merit list to marks, but it requires the use of another percentile curve The marks of *all* the 610 candidates with whom we started can be distributed; the table in the above case (percentage marks for English + arithmetic, the marks having been adjusted before addition so as to equalize their spreads) would be as follows

Marks	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100
Percentage of Candidates	0 6	3 3	8 7	19 5	23 6	23 6	13 9	6 8	0	0	0
Cumulative Percentages	0 6	3 9	12 6	32 1	55 7	79 3	93 2	100	100	100	100

AGE ALLOWANCES FOR DIFFERENT BIRTH-MONTHS

PER-CENTILE	MARK %	MONTHLY BONUS	ALLOWANCE MARKS FOR											
			AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY
93	70	1 2	0	1	2	4	5	6	7	8	10	11	12	13
90	67	1·3	0	1	3	4	5	7	8	9	10	12	13	14
85	63	1 32	0	1	3	4	5	7	8	9	11	12	13	15
80	60	1 35	0	1	3	4	5	7	8	9	11	12	13 5	15
75	58	1·37	0	1	3	4	5	7	8	10	11	12	14	15
70	56	1 37	0	1	3	4	5	7	8	10	11	12	14	15
65	54	1·42	0	1	3	4	6	7	9	10	11	13	14	16
60	52	1 47	0	1	3	4	6	7	9	10	12	13	15	16

The corresponding percentile curve can then be drawn, and from it can be read off the mark corresponding to one-fourteenth of the way down (percentile 93), one-tenth of the way down (percentile 90), and so on Suppose that all candidates had to be at least 11 on the first of August then the August births are the oldest group, needing no bonus, and the July births are the youngest group, needing the maximum bonus of eleven times the monthly allowance in marks Combining the results obtained for the connexion of marks with percentiles with our previous table, we obtain the following results expressed in the table on p 152 In each case the age allowance in marks has been taken to the nearest whole mark Now in any case where results have been obtained approximately from curves, it is possible to smooth out the results a little so as to obtain the best possible sliding-scale Here, for instance, is a simple instruction about age allowances based on the above table, in a form ready to hand to the clerk making the entries.

AGE ALLOWANCES FOR DIFFERENT BIRTH-MONTHS
ADD ALLOWANCE MARKS TO TOTAL PERCENTAGE MARK

MARK OUT OF 100	ALLOWANCE MARKS FOR											
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY
70 upward	0	1	2	4	5	6	7	8	10	11	12	13
65 to 69	0	1	3	4	5	7	8	9	10	12	13	14
60 to 64	0	1	3	4	5	7	8	9	11	12	13	15
55 to 59	0	1	3	4	5	7	8	10	11	12	14	15
Below 55	0	1	3	4	6	7	9	10	12	13	15	16

Such an instruction is all that is necessary for an examination selecting the ablest candidates. Those with 80 marks should have a less allowance than that of the top line, but, whatever happens, they have their awards Those below 40 marks should have smaller allowances than those of the last line, but in any case they are out of the running If, on the other hand, this method is used in dealing with *all* the children born in the different months and not with a selection of them, and aims at placing all the children in their

correct niche for post-primary education, the four quarterly percentile curves illustrated on p 150 would be reliable for the whole of their extent, and the tables given could be continued down below the 60 percentile or two-fifths down the order-of-merit list to percentile 0 or the very bottom of the list, if desired

This method can be used with even more justice in finding an age allowance for each subject separately. in such a case separate marks for English or arithmetic are used throughout It is certain that in some examinations separate allowances are essential, as arithmetic requires so much greater an allowance than English (see p. 83). In the example used as an illustration special circumstances were operative which made the use of the joint marks justifiable.

3. *Comparison of Assistant Examiners' Marking with the Central Standard*

We have already seen how distribution graphs can be used to compare the marking of one examiner with that of the chief examiner, or the marking of one section of the examination candidates with that of another section. Percentile curves can be similarly used It must be pointed out, however, that while the information they give to those experienced in reading them is of greater value than the information received from a simple distribution graph, yet those lacking this experience will obtain a more satisfactory basis of comparison by using the simple distribution graphs of pp 71, 142–143 When percentile curves are used for purposes of comparison, a table of analysis of marks is made for the results of about one thousand scripts (at least seven hundred) marked by the chief examiner, cumulative percentages are entered on the table, and so the chief examiner's percentile curve is drawn. For such large numbers, especially if selected to represent every type of district in the whole area, a well-shaped smooth curve results. A tracing of it is made for application to the similar curves drawn from the analyses of the assistant examiners made as described on p. 68. Their curves, in contrast, are smooth and shapely only for very good marking, and may be thrown

out of shapeliness not only by errors in marking but by being predominantly representative of a very large area where the standard of work is very high or very low. The smaller numbers involved (about 500 scripts) in any case make deviation from smoothness likely. In fact the form of these curves is so sensitive to vagaries of all kinds that the application of the traced central curve to the individual examiner's curve gives most valuable information to the chief examiner More than this it seems unwise to say in a work of this kind The best means of educating oneself in the use of percentile curves is to draw them on every suitable occasion, and learn by using them what to expect and how best to obtain information from them.

APPENDIX B

Complete English test for eleven-year-old children with marking-scheme.
Two samples of comprehension tests

English Test and Marking-scheme

65 minutes allowed

You should spend about 40 minutes on Questions I and II and begin Question III not later than 11 40

I. *Read the following passage very carefully*

The sun was at its highest when our juvenile party assembled in the dell, through the *depths* of which *ran* a little brook The dell was narrow, and its *precipitous* sides, from the *margin* of the stream upward, were thickly set with trees, chiefly walnuts and chestnuts, among which grew a few oaks and maples In the summer time, the shade of so many clustering branches, meeting and intermingling across the rivulet, was deep enough to produce an appearance of twilight. Hence came the name of Shadow Brook. But now, ever since Autumn had crept into this *secluded* place, all the dark verdure, except where here and there was a larch tree, was changed to gold, so that it really *kindled* up the dell, instead of shading it. The bright yellow leaves, even had it been a cloudy day, would have seemed to keep the sunlight among them; and enough of them had fallen to strew all the bed and margin of the rill with sunlight too. Thus the shady nook, where summer had cooled herself, was now the sunniest spot to be found.

Now answer the following questions from information to be found in the passage:

(1) How many kinds of trees are named in the passage?

(2) What was the time of day and what the season of the year when the party of children visited the dell?

157

(3) Give three other words used for "brook" in the passage

(4) At what season of the year is "Shadow Brook" a good name for this place? Give a reason

(5) At what season of the year is "Shadow Brook" an unsuitable name for this place? Give a reason

(6) Give another word which could be used in the passage instead of each of the words in italics, without altering the meaning. The words are (*a*) depths, (*b*) ran, (*c*) precipitous, (*d*) margin, (*e*) secluded, (*f*) kindled

II Below is a description of a part of a letter to Mary Smith from a friend Write the exact words used in the letter, beginning "I will come to see . . ." Take special care with the punctuation.

Mary Smith, who lived in London, received a letter from a friend, saying among other things that she would go to see Mary on the following Saturday afternoon, because she had something specially interesting to show her She said she would reach Mary's house soon after dinner, and thought she would be able to stay till about 9 o'clock She hoped that Mary would go to the pictures with her, as since they had moved to the country, she didn't go very often. She asked Mary how her brother was and hoped he was better. She told Mary not to forget to wait for her on the Saturday.

III. Write a composition of not less than a page on *one only* of the following:

(*a*) Public Libraries.

(*b*) An account of some book, play, or other entertainment that has made you laugh.

(*c*) A story called "Thirteen."

(*d*) The joys of a country life.

General Instructions for Marking

N.B. These instructions apply in all cases unless an exception is indicated in the detailed marking-scheme.

ENGLISH MARKING-SCHEME

They should be read by the examiner before and in close connexion with the detailed marking-scheme.

1. All marking should be done in BLUE PENCIL

2 The total marks obtained for a question should be written in the left-hand margin opposite the answer. Marks obtained for parts of a question should be written in the right-hand margin opposite the answer

3. No fractional marks are to be entered in the left-hand margins or on the mark-schedules. If the sum of the detailed marks given to an answer involves a fraction, the nearest unit, or in the case of $\frac{1}{2}$ mark, the upper unit, should be entered If a candidate has not attempted a question, put a dash—but *not* o on the mark-schedule

4 The total marks obtained for the whole paper should be entered in the top right-hand corner of the front sheet of the script in the rectangular space provided

5 When the scripts contained in an envelope have been marked, the marks of each candidate should be entered in BLACK INK opposite his number in the mark-schedule

6 The scheme of marking must be followed in every detail

7 No credit should be given for answers crossed out by the candidates.

8. If a candidate has written more than one essay and has not crossed out all but one, the first complete one not crossed out should be marked

9. All spelling, grammatical, and mechanical punctuation mistakes for which deductions are being made in accordance with the detailed instructions for marking Question III should be indicated by a ring round the mistake. All other mistakes should be underlined.

Detailed Instructions

Allocation of Marks

Question I (1) 1, (2) 3, (3) 4; (4) 6, (5) 7, (6) 14 ·	35
Question II ·	20
Question III Thought and Structure—35. Mechanical	
Accuracy—10 · · · · · ·	45
	100

Question I 35 *marks*

(1) 1 mark .

Five or 5   1

If the kinds are named, but the number not explicitly stated   .   .   0

(2) 3 marks 1 for time of day, 2 for season.

Noon, midday, dinner time, afternoon   1

When the sun was at its highest   .   0

Autumn (No alternative)   2

(3) 4 marks. 1 each for *stream* and *rivulet*, 2 for *rill*

(4) 6 marks For season, 2, for reason, 4

Summer (No alternative.)   .   .   .   2

Because the leafy trees shaded the spot   .   4

N B Leaves are not mentioned explicitly in the passage if they are not mentioned in the answer, there must be some reference to the close-growing branches for 4 marks If trees are mentioned as giving shade without reference to branches or leaves   2

If trees are not mentioned, *e g.*, "Because it will be shady"   .   .   0

(5) 7 marks For season, 2; for reason, 5

Autumn (No alternative)   .   .   2

Because the golden leaves were scattered about and made it seem sunny   .   .   5

The colour of the leaves (3 marks) and the fact that they have fallen (2 marks) must both be mentioned for full marks

If the reason given is that the *larch* tree has turned yellow   0

The branches are bare and let the light through (implied in the passage, but not the whole reason)   2

Because it's the sunniest spot to be found .   .   0

(6) 14 marks. (*a*) (*b*) (*d*) (*e*) 2 each, (*c*) and (*f*) 3 each   .   .   .   .

(*a*) Bottom   2

(*b*) Flowed   2

Trickled, babbled, gurgled, chattered, etc.   .   1

(*c*) Steep   3

High   1

(*d*) Side, edge, brink, bank or sides, edges, etc. .   2

(*e*) Hidden, lonely, solitary, quiet, sheltered, or
   any word which has some connexion with
   the meaning of *secluded*   2
(*f*) Lit, lighted, brightened   3
   Lit up, etc   .   2
   Light   .   .   1

If in question 6 an alternative incorrect word is given as
well as the correct one, give only 1 mark.

Question II. 20 marks

In the following version the points to be marked are
enclosed within brackets and numbered.

I will come to see (you)¹ (next)² Saturday afternoon,

because (I)³ (have)⁴ something specially interesting to show

(you)⁵ (I)⁶ (shall)⁷ reach (your)⁸ house soon after dinner

and I (think)⁹ (I)¹⁰ (shall)¹¹ be able to stay till about nine

o'clock. (I)¹² (hope)¹³ (you)¹⁴ (will)¹⁵ go to the pictures with

(me)¹⁶, (as, now we have moved)¹⁷ to the country, (I)¹⁸ (don't)¹⁹

go very often. (How is your brother)²⁰ (?)²¹ I hope (he)²²

(is)²³ better (Don't forget)²⁴ to wait for (me)²⁵ (on)²⁶ Saturday.

Nos. 1 to 16, 18, 19, 22, 23, 25, and 26 ½ mark each	11
Nos. 17 and 21. 1 mark each	2
Nos 20 and 24. 2 marks each .	4
For exercise as a whole, including correct copying, punctuation, and not giving what was not asked for	3
	20

Notes

(2) Accept "on" as implying "next"

(7) Accept "will."

(9) Note that "I" of "I think" can be omitted and is
not to count as a point.

SELECTION OF CHILDREN

(11) "Will" is *not* to be accepted here

(17) There are several possible correct alternatives, *e.g* , "since we moved."

(19) and (24) Accept "do not" for "don't "

(26) This point is marked for omitting the "the "

Question III   45 marks

Thought and structure—35 marks

The following sub-divisions should be used in estimating the marks to be awarded under this section ·

Relevance of whole essay to title	5	
Quantity and quality of ideas	9	A.
Consistency and logical sequence of ideas .	5	
Quality of opening and closing	3	
Variety of sentence-construction and punctuation as affecting sentence-construction .	5	
Quantity, quality, and aptness of vocabulary .	6	B.
Paragraphing (1 for an attempt, 2 for a successful one)	2	

It is not essential, though it may be helpful, to enter all the above details on the scripts. Totals earned in Sections A and B respectively will be required. (See after next section)

An exceptionally good or an exceptionally poor essay may be marked out of 35 marks without reference to the detailed scheme. This applies only to answers to which it is desired to award marks in the ranges 30 to 35 or 0 to 6.

Mechanical Accuracy—10 marks

Give 10 marks for the first 140 words (about 20 lines of average writing), ignoring the title Give less in proportion to the amount written If more than 140 words has been written, mark off the end of 140 words and ignore the rest

From this mark for length deduct

(a) One mark for each spelling-mistake, one mark for each bad mistake in grammar, and one mark for each mechanical mistake in punctuation.

(*b*) Up to, but not more than, two marks for omission or misuse of capital letters

(*c*) Up to, but not more than, two marks for almost illegible handwriting or untidy or cramped work

If a mistake under (*a*) is repeated it counts only once for deduction.

A word containing two mistakes (*e g*, a spelling- and a grammatical mistake) counts as only one mistake for deduction; but if the same word contains one kind of mistake in one place and another kind in another it counts as two mistakes for deduction

Deductions must not be used to cancel marks already awarded under thought and structure. If, therefore, the deductions exceed the mark given for length, the mark for mechanical accuracy will be 0 and *not* a minus quantity

Deductions under (*a*) and (*b*) may be added together and entered as one number

At the end of the essay the marks earned for Section A, Section B, and mechanical accuracy (in detail) should be entered towards the right-hand side of the page, and the total in the left-hand margin, thus:

$$\text{or} \quad \begin{array}{c|} 23 \\ 8 \end{array} \qquad \begin{array}{c|} 12 + 5 + (10 - 4 - 0) \\ 5 + 3 + (\ 8 - 9 - 1) \end{array}$$

Apostrophes   Misuse or omission of apostrophes counts as a spelling-mistake, but only two marks may be deducted for these, one for one or more mistakes in the possessive case, and one for one or more mistakes in abbreviations

Grammatical Mistakes.   Candidates should not be penalized for grammatical mistakes made in attempting unusual or difficult constructions, but only for such mistakes as "we was" or "the cup was broke in pieces"

Punctuation   Mistakes such as the use of a full stop where the sense does not warrant it are questions of structure. Mistakes such as the omission of question marks or inverted commas are questions of mechanical accuracy

Capital Letters   One deduction should be made for a mistake connected with punctuation such as omission of a

SELECTION OF CHILDREN

capital letter after a full stop, and one for a mistake connected with the permanent form of a word such as omission of a capital letter for a proper noun.

Proper Nouns. Not more than two marks are to be deducted for mistakes in the actual spelling of proper nouns, but proper nouns may also count for deductions with regard to the use of capital letters or apostrophes within the limits already stated.

COMPREHENSION TESTS

I.—*Read the following passage very carefully:*

It was a pretty scene, though it was too familiar to the eyes of all who then saw it for them to notice its beauty. The sun was low enough in the west to turn the mist that filled the distant valley into golden haze. Above, on each bank of the Dee, stretched the moorland heights swelling one behind the other; the nearer, russet brown with the tints of the fading bracken; the more distant, grey and dim against the rich autumnal sky. The red tiles of the houses rose crowded and irregular on one side of the river, while the newer suburb was built in more orderly and less picturesque fashion on the other. The river itself was fighting with the incoming tide till its waters rushed over the very feet of the watching crowd. In the river the white-sailed ship was rocking up and down as if in greeting. You can imagine that her crew were impatient for the moment of landing, for they had not been able to have any news of England or of those they loved for six long months.

Now answer the following questions from information which you can find in the passage:

(1) At which season of the year and about what time of day did the ship arrive in the river?

(2) At which season of the year had it departed?

(3) Give in your own words a reason why the people on the river bank did not notice the beautiful scenery.

(4) Is the part of the river described in the passage a very long way away from the sea or not? Give a reason for your answer.

164

(5) Say which of the following sentences are true and which untrue according to the passage   Correct the untrue sentences by altering *one* word only in each.

(*a*) The distant hills were brown
(*b*) The ship had been away six years.
(*c*) The houses in the older part of the town had red-tiled roofs.
(*d*) The ship had a wireless apparatus
(*e*) The newer part of the town was not so picturesque as the old.

II. *Read the following passage very carefully·*

The morn rose blue and glorious o'er the world;
Our steamer left the black and oozy wharves
line (3)   And floated down between dark ranks of masts
We heard the swarming streets, the noisy mills,
Saw sooty foundries full of glare and gloom,
Great towering chimneys tipped by tongues of flame.
Slowly we passed the clanging building-yards,
line (8).   Where, in the slips, the mighty skeletons
Patiently waited while a thousand hands
To their bare ribs hammered the plates of steel.
Behold the Giant Cunarder five-three-four [1]
No gaping wounds can in her sides be seen,
line (13).   For, ere seven days have passed, she'll slowly slide
line (14)   Amid the flutter of innumerable flags,
line (15)   The shouts of thrice ten thousand happy men,
line (16)   To her true home upon the waters deep
We cheer her as we pass   At length the stream
line (18)   Broadened 'tween banks of daisies, and we sailed
Past sunny hills down to the open sea.

Now answer the following questions:

(1) Write down a suitable title for the passage
(2) How do you know that these lines were not written a very long time ago? [1]

[1] The passage was set in 1935.

(3) Explain what is meant by "skeletons" in line 8

(4) Give the meaning of the four lines 13, 14, 15, and 16 in your own words in one sentence

(5) The word "between" is written in full in line 3, but as "'tween" in line 18: why is this?

(6) Write down words which according to what we are told in the passage would fill in the gaps in the following sentences: give only one word for each gap

(a) We set off on our voyage ... ... in the morning.

(b) The big ship had not yet been given a name, so it was known by a . .   ..

(c) The scenery at the... ... of the river was very beautiful.

APPENDIX C

COMPLETE Arithmetic test for eleven-year-old children with detailed marking-scheme

ARITHMETIC. MENTAL TEST

10 minutes allowed

Work each sum in your head, and write ONLY the answer in the space provided opposite each sum

Answers

1. How much money must be added to £3 19s. 11d. to make £5?

2. What is the cost of five knives at 1s 3d each together with five spoons at 9d each?

3. Find the cost of ¾ lb. of chops at 1s. 10d a lb.

4. Write in decimal form 301 hundredths.

5 What is the cost of 7½ yards of material at half a crown a yard?

6. What is the cost of 1 gall. 3 qt. 1 pt. of milk at 7d. a quart?

7. If you count from one end of a row of girls, Joan is the 9th girl; but if you count from the other end of the row, she is the 22nd girl. How many girls are there in the row?

8. If a boy writes £0·5 in error for £0·05, by how many shillings is he wrong?

SELECTION OF CHILDREN

9. The price of bacon has fallen from 1s. 3½d to 1s 2d a lb What difference does this make in the cost of 160 lb. of bacon?

10. How many minutes are there from 11 33 a m to 1.13 p.m on the same day?

11. If an upright stick 5 feet high throws a shadow 2 ft 7½ in long, how long will be the shadow of an upright stick 2 ft 6 in. high?

12 A quarter of a pole is painted blue. One-eighth of the pole is painted green The rest of the pole is painted white. If the white part of the pole is 3 ft. 4 in. high, how high is the whole pole?

ARITHMETIC

1 hour allowed

Work as many questions as you can

PART I. ACCURACY TEST

1. (*a*) Multiply 786 by 109.
   (*b*) How many square inches are there in an oblong 9¾ inches long and 2¼ inches wide?

2 (*a*) Find the total length of

$$11\tfrac{1}{2} \text{ in } + 7\tfrac{7}{8} \text{ in } + 2\tfrac{5}{12} \text{ in.} + \tfrac{1}{4} \text{ in.}$$

   (*b*) How much longer than 1 mile 5 furlongs 8 chains is 3 miles 5 furlongs 7 chains?

3. (*a*) Find in £ s d the value of 3199 threepenny pieces.
   (*b*) If 14 lb of butter costs 18s 4½d, how many lb. of the same butter can be bought for 5s. 3d.?

PART II PROBLEM TEST

Be careful to show HOW *you do every sum*

4. A man bought 3¾ tons of coke at 23s. 10d. a ton He weighed this coke out into 140 bags which he sold at 11d. a bag.

168

(*a*) How much profit altogether did the man make?

(*b*) If each bag contained the same weight of coke, how many pounds less than ½ cwt. did the coke in each bag weigh?

5. Below is the plan of a design made from three squares set evenly about the dotted middle line. The sides of the squares are respectively 7 feet, 5 feet, and 2 feet.
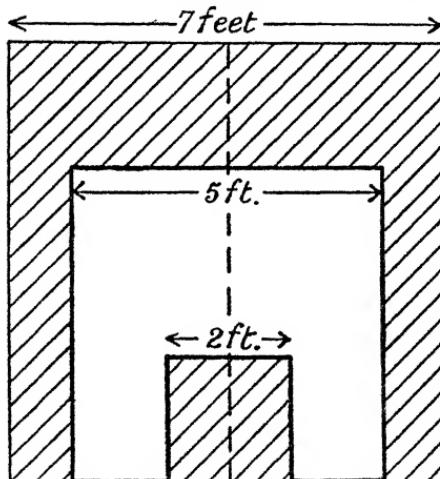
(*a*) Find the total length of the thick black outline.

(*b*) Find the total area shaded.

6 An English girl in Paris brought 7 5 metres of silk at 24·73 francs a metre At that time £1 of English money could be exchanged for 123 65 francs of French money. What did the silk cost the girl

(*a*) in French money?

(*b*) in English money?

7. Mr *X* set off by aeroplane for Australia at 6 a m. on August 15th and reached Sydney at noon on September 2nd Mr *Y* sailed for Australia at noon on September 30th and reached Sydney at 5 p.m. on October 29th. How many days and hours did Mr *X* save by flying?

8. Thirty-four boys and three teachers went camping for a week. Each boy paid the same amount, but each teacher had to pay ten shillings more than a boy's share   The total expenses were £25 6s 4½d. What was a boy's share?

ARITHMETIC PAPERS
DETAILED MARKING-SCHEME
Total marks   (A) 15 + (B) 28 + (C) 57 = 100

A MENTAL TEST. (Total mark, 15)

Question.	Answer	Marks
1.	£1 0s. 1d. or 20s. 1d	1
	241d. .	½
	Any wrong answer . . .	0
2.	10s.	1
	120d. . .	½
	Any wrong answer . .	0
3.	1s. 4½d. or 1⅜s. — . .	1
	16½d.	½
	Any wrong answer . .	0
4.	3·01	1 or 0
5.	18s. 9d. or 18¾s. or 18·75s. . .	1
	225d.	½
	Any wrong answer .	0
6.	4s. 4½d. or 4⅜s.	1
	52½d.	½
	Any wrong answer .	0
7.	30 (80th, allow ½) . . .	1½ or 0
8.	9	1½ or 0
9.	£1 or 20s.	1½
	240d. or 1 or 20 . . .	1
	£20 and other wrong answers . .	0
10.	100	1½
	1 hr. 40 min. or 1⅔ hr. . . .	1
	Any wrong answer . . .	0

170

ARITHMETIC MARKING-SCHEME

Question	Answer	Marks
11.	$\Big\{$ 1 ft. $3\frac{3}{4}$ in. *or* $15\frac{3}{4}$ in. .	$1\frac{1}{2}$
	$15\frac{6}{8}$ in., etc . .	1
	Any wrong answer .	0
12.	$\Big\{$ 64 in *or* 5 ft. 4 in. *or* 1 yd 2 ft. 4 in	$1\frac{1}{2}$
	Any wrong answer . .	0

B ACCURACY TEST (Total mark, 28)

Special Marking-instructions

In the case of a wrong answer, care should be taken that the candidate is awarded some marks if the wrong answer is due to a mistake in copying. For instance, in 2(a), addition wrongly copied but correctly worked deserves 5—3 marks.

Make, however, a further deduction, if the error in copying results in simplified working. Thus the mark for 3(a), if 3199 is copied as 3196, is zero, because the one mark left (3—2) is lost because the working is simplified.

Question	Answer	Marks
1 (a)	85,674 . . .	4 or 0
(b)	$\Big\{$ $21\frac{15}{16}$ . .	5
	$21\frac{30}{32}$, etc, *or* $3\frac{51}{16}$	4
	$\frac{702}{32}$, etc. .	3
	Otherwise . . .	0
2 (a)	$\Big\{$ $22\frac{1}{24}$ in. *or* 1 ft. $10\frac{1}{24}$ in. . .	5
	$22\frac{2}{48}$ etc, *or* $5\frac{29}{24}$ or 20 and $2\frac{1}{24}$	4
	$\frac{1058}{48}$, etc., $20\frac{42}{24}$ . . .	3
	$20\frac{58}{48}$, etc. . . .	2
	Otherwise . . .	0
(b)	1 m. 7 fur. 9 ch. . .	4 or 0
	(Accept any correct answer, *e g.*, $1\frac{78}{80}$ miles or 3,498 yards.)	
3 (a)	£39 19*s* 9*d*. . . .	3 or 0
(b)	4 lb.	7 or 2 or 0
	(For correct method, implicit or explicit, allow 2 marks.)	

SELECTION OF CHILDREN

C PROBLEM TEST. (Total mark, 57)

Calculation Errors In each question, deduct 2 marks per error, but not more than 5 in all for any question Note that the marking of Question 7 is exceptional.

<div align="right">

*Marks for
each step*
</div>

4 (*a*) £1 3*s.* 10*d.* × 3¼ = £3 17*s* 5½*d.*   3
      11*d* × 140 = £6 8*s* 4*d.*   .   2
      Profit = £2 10*s.* 10½*d.*   .   .   2
<div align="right">

—
7
</div>

Alternative

     I. As above, £3 17*s* 5½*d* .   .   3
     II. I — 140 = 6$\frac{178}{280}$*d* (App. 6½*d or* 6$\frac{89}{140}$*d*) .   .   1
     III. 11*d.* — II   1
     IV. III × 140 = £2 10*s* 10½*d.* .   .   2

        For such an approx as 4½*d.* × 140 = £2 12*s.* 6*d* deduct 1, but accept 4$\frac{51}{140}$ × 140 = £2 10*s.* 11*d.*

Frequent Error

        140 × 11*d.* = £6 8*s* 4*d.* .   .   .   2
        £6 8*s.* 4*d.* — £1 3*s.* 10*d.* = £5 4*s.* 6*d.* .   .   2
<div align="right">

—
4
</div>

   (*b*) 3¼ tons — 140 (idea)   1
        = 52 lb or 1 qr. 24 lb , etc .   .   .   2
        ½ cwt — 52 lb = 4 lb .   .   2
<div align="right">

—
5
</div>

Alternative

        1 ton ÷ 140 = 16 lb.   1
        16 lb. × 3¼ = 52 lb. .   .   .   2
        ½ cwt. — 52 lb. = 4 lb. .   .   2

Wrong Solution

        If a fraction of a cwt. (1$\frac{3}{25}$ cwt.) given as answer, allow 2 if correct and "reduced." For $\frac{6 5}{1 4 0}$, etc., allow 1

        Total marks for Question 4 = 7 + 5 = 12.

ARITHMETIC MARKING-SCHEME

5 (*a*)   Side widths $= 1\frac{1}{2}$ ft (explicit or implicit)   2
       $3 \times 5 + 3 \times 2 + 2 \times 1\frac{1}{2}$, allow 1 each   3
       24 ft, only if correct, add   1
                                   6

Alternative

     4×5 ft. $- 2 \times 2$ ft. (stated together)   5
     24 ft, only if correct, add   1
                                   6

Frequent Wrong Answers

    Work correct, but *square feet*. deduct 2
      If in. or yd for ft, deduct only 1.

    4×5 ft. $- 2$ ft   Allow 2

    4×5 ft. $+ 1 \times 2$ ft   Allow 2
    But 4×5 ft $+ 3 \times 2$ ft   Allow 1.

     N B. Full marks for 24 feet with no working
shown

(*b*)   I. 2×2 sq. ft. .   .   1
     II. 2×5 sq. ft. .   1
    III. 1×7 sq ft .   .   .   1
    III doubled   1
        $4 + 10 + 14 = 28$ 2
                                       6

Alternative I

     I. 2×2 sq ft.   1
    II. 2×7 sq. ft.   1
   III. 1×5 sq. ft. . .   1
   III. doubled   1
       $4 + 14 + 10 = 28$.   .   .   2

Alternative II

     $49 - 25 = 24$ 3
     $24 + 4 = 28$ 3

SELECTION OF CHILDREN

Alternative III

Unshaded area	I 2×3 sq ft	1
	II. $5 \times 1\frac{1}{2}$ sq ft	1
	II. doubled .	1
	$6 + 15 = 21$	1
Reqd. area $= 49 - 21 = 28$.	.	2
		6

Alternative IV

Unshaded area	I. 5×3 sq. ft	1
	II. $2 \times 1\frac{1}{2}$ sq ft	1
	II. doubled	1
	$15 + 6 = 21$	1

Remainder as in III above.

Alternative V

Unshaded $= 25 - 4$ (idea) .	2
$= 21$.	2

Remainder as above.

Frequent Wrong Answers. Work correct, but feet for sq. ft .
deduct 2. If yards or inches for feet, deduct only
1. Accept 28 *square* feet, with no working. Give 4
marks to answer 28 *feet*, with no working.

Total marks for Question $5 = 6 + 6 = 12$.

6 (*a*) $24\cdot73$ francs $\times 7 \cdot 5$ (idea)   1
$= 173\cdot11 + 12.365$
$= 185\cdot475$ 3
4

If decimal point in wrong place, deduct 2 . if
missing, deduct 3
Correct use of vulgar fraction to be accepted.

(*b*) $185\cdot475 - 123\cdot65$ (idea)   2
$= 1 \cdot 5$ 4
6

Accept answer £1 5, *i.e.*, ignore mistakes occur-
ring afterwards.

ARITHMETIC MARKING-SCHEME

*Marks for
each step*

Alternative I

185 475 — 123 65	1
Silk cost £1 + 61 825 fr	1
123 65 — 61 825 (idea)	1
= 2	2
Silk cost £1 5, £1½, etc	1
	—
	6

Alternative II

123 65 — 24 73 (idea, explicit or implicit)	2
24 73 fr = £⅓ or 4s	2
4s × 7½ = £1 10s	2

Alternative III

12 365 = 2s	Allow	2
24·73 = 4s		2
Then as above		

In (b) for errors with the decimal point deduct 2
but not more than 2

Total marks for Question 6 = 4 + 6 = 10

7.   *Mr X*

18 days 6 hr Allow 3 + 1	4
18 days, wrong hour (0 .. 11) 3 + 0	3
19 days 6 hr .	3
19 days wrong hr .	2
Any other days, 6 hr	1

A m and p m error

17 days, 18 hr. . . .	Allow	3
18 days, wrong hr (12 ... 23) . .		2
Otherwise .	.	0

Mr Y:

29 days, 5 hr. . .	Allow	4
29 days wrong hr (0 .. 11) .		3
30 days 5 hr. . . .		3
30 days wrong hr. . .		2
Any other days, 5 hr . . .		1

175

<div align="right">Marks for
each step</div>

A m and p m error

28 days 17 hr   3
29 days wrong hour (12   23)   2
Otherwise   0

Time saved $= Y - X =$ 10 days 23 hr   Allow   3

Deduct 2, if inaccurate If previous mistakes make subtraction easier, deduct 1 or 2 marks accordingly

Same error occurring in calculating both times counts twice But if 1 day taken as equal to 60 hours, penalize only once. Accept working in hours Deduct 2 for answer in hours.

<div align="center">Total marks 4 + 4 + 3 = 11.</div>

8.   £25 6s $4\frac{1}{2}d$ — £1 10s $=$ £23 16s $4\frac{1}{2}d$ 3
     £23 16s $4\frac{1}{2}d$ — 37 (idea)   4
     $=$ 12s. $10\frac{1}{2}d.$.   .   5

<div align="center">Total marks = 12</div>

If further working is done to obtain a "boy's share" deduct 2 from total.

Wrong Solutions Method of marking Division of Money

Maximum mark (divisor *or* dividend or *both* wrong)   5

Remainder in *d.* and *h p.* must be given *either* as fraction of 1*d or* brought to farthings *or* used to obtain an approximation stated "to the nearest penny"· otherwise deduct 2. If brought to half-pennies, unless remainder is given as fraction of $\frac{1}{2}d.$, maximum mark is 4.

Easy divisor, *e.g* , — 40 .   .   maximum mark   3
Absurd divisor, — 10   .   .   .   mark is   0

Common Instances

£23 16s. $4\frac{1}{2}d.$ ÷ 34 = 14s. $\frac{0}{8}\frac{0}{8}d.$ (3 + 5) .   .   8
£25 6s. $4\frac{1}{2}d.$ — 37 = 13s. $8\frac{1}{7}\frac{1}{4}d.$.   .   .   5
£25 6s. $4\frac{1}{2}d.$ — 34 = 14s. $10\frac{6}{8}\frac{0}{8}d.$.   .   .   5

INDEX

INDEX

INDEX